

Independent Reporter A

**Annual Return 2005
Final Report**

September 2005

Halcrow Group Ltd

Halcrow

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Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Initial
1	0	Interim Report	22/07/05	DJM
1	1	Final Report for checking	17/08/05	DJM
1	2	Final Report	18/08/05	DJM
1	3	Final Report incl. comments	14/09/05	DJM

1 Executive summary

1.1 Reporter's scrutiny and opinion

- 1.1.1 Network Rail has appointed Halcrow Group as Reporter A to provide reporting services to the Office of Rail Regulation for certain of the measures in its Annual Return.
- 1.1.2 This report presents our views and analysis of Network Rail's Annual Return 2005 to the ORR. It follows our reports on previous Annual Returns, which can be found on the ORR website.
- 1.1.3 The Reporter, Jon Bateman, and the Reporting Team of technical specialists have undertaken audits at Network Rail Headquarters, Territories and Areas as appropriate.
- 1.1.4 The following areas were covered during the audit of the Annual Return.
- (a) A review of the quality of the process by which the Annual Return 2005 has been compiled, including identifying the procedures used by Network Rail to measure, collect, prepare, analyse and report data and information.
 - (b) An audit of the numerical data presented in the tables in the Annual Return 2005 comprising, on a sample basis, checks of the methods used by Network Rail for collating the reported data and examination of the audit trail from the data presented in the tables in the Annual Return to the source of the data to verify the reliability and accuracy of the data. Evidence has been collected to support this audit process where necessary.
 - (c) Identification of assumptions that have been made, confirmation of why these have been made and reporting on assumption justification and any material impact on the figures reported.
 - (d) An assessment of the reported data against the regulatory targets.
 - (e) A review of the commentaries associated with each table in the Annual Return 2005.
 - (f) A review of the appropriateness of the confidence grades assigned by Network Rail to each measure.
 - (g) An examination of changes in data and performance from previous years' Annual Return data and identification of any material trends.
- 1.1.5 Halcrow has previously been responsible for reporting on all the Annual Return measures specific to four geographical Regions and for two HQ-only indicators.
- 1.1.6 During the 04/05 year, Network Rail has reorganised (a) moving from a geographical organisational structure to a functional structure and (b) in-sourcing maintenance activity which was formerly contracted to Infrastructure Maintenance Companies (IMCs). This has made it necessary to reallocate responsibilities between the Reporters, as specified by Office of Rail Regulation and Network Rail.
- 1.1.7 This year, therefore, Halcrow is responsible, on a national basis, for reporting on eighteen measures, principally covering track, signalling, electrification and telecoms, plus the asset stewardship incentive indicator (ASII) and the business plan reconciliation for these four asset classes.
- 1.1.8 Our audits and analysis of the data provided enable us to present the following findings:
- (a) The data presented in the Annual Return 2005 has, on the whole, been collected and processed in a diligent manner.
 - (b) Network Rail generally complies with the procedures and guidance for the monitoring, collection and collation of the Annual Return data as agreed by the Regulator. With the exception of measure M2 track defects, we found only minor

deviations which do not materially affect the reported data. However, there remain shortcomings in the internal auditing and checking of some of the measures which is a cause for concern.

- (c) There remains potential for inconsistent assessment of condition for Signalling and Electrification assets due to the subjective nature of these assessment processes. This is further exacerbated by the lack of internal auditing and checking.
- (d) While the Annual Return measures give a high level view of performance, we note that there is potential for some developments in the measures which, if carried out, would allow a more detailed and reliable assessment of Network Rail's performance.
- (e) The accurate reporting of asset condition assessment measures is reliant on the experience and specific, independent knowledge of the engineers carrying out the assessments. Measures must therefore be established to ensure sufficient training, transfer of this knowledge or improved structuring of the assessment processes to reduce this reliance.

1.1.9 Network Rail have co-operated with the Reporting Team, providing relevant information and appropriate time to the audit process.

1.2 Reporter's overview of the Annual Return 2005

1.2.1 We note that Network Rail's reported level of stewardship performance, reflected in the condition and serviceability measures, has generally shown an improvement against that reported in 2003/04 whilst core network renewals expenditure has significantly decreased. We note, however, that renewals expenditure over the past five years peaked in 2003/04 and that for a number of assets serviceability measures, progress against previous targets set for the period 2000/01-2003/04 had not been achieved. A number of regulatory target baselines for Control Period 3 have been re-set following the Access Charges Review 2003 on the basis of improvement against the reported performance of 2003/04 or earlier. Notably, for signalling and electrification this has led to an easing of performance targets for Control Period 3, whilst for track this has led to setting of more stringent targets.

Number of broken rails (M1)

1.2.2 **Performance.** 322 broken rails were reported for 2004/05, bettering last year's performance of 334 per annum. The number of rail breaks for 2004/05 has continued the downward trend of this measure since 2000/01. The result for 2004/05 is a 3.6% improvement on 2003/04. Despite the national downward trend in the number of broken rails, there has been a slight increase for two Territories, LNE and South East.

1.2.3 **Regulatory target.** There is no regulatory target for this measure this year.

1.2.4 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure. The process is closely managed and the figures internally reported on a daily, 4-weekly and annual basis. We believe that M1 should have a reliability grade of A.

1.2.5 **Accuracy grade.** Two parallel systems are used to identify broken rails for this measure and a reconciliation process is used to increase accuracy. The process would have to misreport four broken rails or more in 2004/05 to have an inaccuracy of 1% or higher; our assessment is that the accuracy of this process would not allow this level of misreporting. We believe that M1 should have an accuracy grade of 1.

Number of rail defects (M2)

1.2.6 **Performance – isolated defects.** In 2004/05, the number of isolated defects was 30,778. This year's performance shows 1.6% fewer defects than the initially reported figures for 2003/04 but 14.0% more defects than the subsequently restated figures for 2003/04. There has been a reducing number of isolated defects over the last three years (using either initially reported or subsequently restated figures).

- 1.2.7 **Performance – continuous defects.** In 2004/05, the length of continuous rail defects was 2,423,367 yards. This year's performance shows 18.7% more defects than the initially reported figure for 2003/04 but 5.5% fewer defects than the subsequently restated figure for 2003/04. There has been an increase in the length of continuous defects over the last three years (using either initially reported or subsequently restated figures).
- 1.2.8 **Regulatory target.** There is no regulatory target for this measure.
- 1.2.9 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure; however, there is no mechanism within the procedure for the data owners (the Area track engineers) to sign-off the data reported in the Annual Return. Data correction has been required at the start of each reporting year for the last four years, including for 2004/05. We believe that M2 should have a reliability grade of B.
- 1.2.10 **Accuracy grade.** We have concerns regarding the level of data correction required at the start of the 2004/05 reporting year and the accuracy of the Raildata upload process. We believe that M2 should have an accuracy grade of 4.

Track geometry (M3 & M5)

- 1.2.11 **Performance – National SDs.** The results for 2004/05 for all twelve national standard deviation (SD) parameters are at the highest level of track geometry since 2000/01.
- 1.2.12 **Performance – PTG.** The trends for poor track geometry show a significant level of improvement this year, particularly for Anglia Route.
- 1.2.13 **Performance – speed band data.** The SD results for all speed bands show a decrease for all measures this year compared with 2003/04, indicating better track geometry.
- 1.2.14 **Performance – L2 exceedences.** This year, all Routes had the lowest level of level 2 exceedences per track mile for the last four years, indicating better track geometry.
- 1.2.15 **Regulatory targets.** All twelve of the new regulatory targets for national standard deviation data have been met. There are no regulatory targets for poor track geometry, speed band measures and level 2 exceedences.
- 1.2.16 **Reliability grade.** The definition for this measure is clearly documented. The procedure is clearly defined and is well controlled. The collection and reporting of this measure is a closely managed process which has been in operation for a number of years. We believe that both M3 & M5 should have reliability grades of A.
- 1.2.17 **Accuracy grade.** The data shows considerable consistency between measurement runs; the calculations are subject to checking. We believe that both M3 & M5 should have accuracy grades of 1.

Condition of asset temporary speed restriction sites (M4)

- 1.2.18 **Performance.** In 2004/05, there were 942 TSRs on the network with a total severity score of 4,622. The number of TSRs caused by earthworks and structures has reduced significantly, by 56% and 28% respectively. The severity of TSRs caused by earthworks also showed significant improvement this year, by 51%.
- 1.2.19 **Regulatory target.** The regulatory target for this measure has been met.
- 1.2.20 **Reliability grade.** The definition for this measure is clearly documented. The documented procedure does not fully reflect the new organisation but has been followed for collecting planned TSRs and for much of the ESR data; however, some ESR data was not collected in accordance with the procedure. We believe that M4 should have a reliability grade of B.
- 1.2.21 **Accuracy grade.** The use of PPS as a data source has considerably improved the accuracy of the planned TSR data and some of the ESR data. The prime influences on accuracy have been (a) the high quality of planned TSR data which forms the majority of reportable TSRs and (b) the small impact of the lower quality ESR data from South East and LNW Territories. We believe that M4 should have an accuracy grade of 2.

Signalling failures (M9)

- 1.2.22 **Performance.** In 2004/05, there were 24,950 incidents attributed to signalling failures causing more than 10 minutes delay; performance has improved by 3.2% in 2003/04 and 11.2% in 2004/05.
- 1.2.23 **Regulatory target.** The regulatory target for this measure has been met.
- 1.2.24 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure. We believe that M9 should have a reliability grade of B.
- 1.2.25 **Accuracy grade.** The process of delay attribution is a subjective process often undertaken with considerable time pressure. Systematic errors introduced by the mismatch between the definition of this measure and the advice in the Delay Attribution Guide mean that this measure is over-reported but in a consistent manner. We believe that M9 should have an accuracy grade of 3.

Signalling asset condition (M10)

- 1.2.26 **Performance.** In 2004/05, the average condition band was 2.5; however, for the last four years there has been a decrease the number of assets in grade 2 (10-20 years life remaining) and equivalent increase in assets in grade 3 (3-10 years life remaining).
- 1.2.27 **Regulatory target.** The regulatory target for this measure has been met.
- 1.2.28 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure. However, five different assessment methodologies have been used over the last five years to contribute to the current average condition score. The SICA methodology utilises a subjective scoring system which has been rolled out without comprehensive training; however, the process has been undertaken by persons with suitable levels of expertise supplemented by documented guidance and oversight by others. We believe that M10 should have a reliability grade of B.
- 1.2.29 **Accuracy grade.** The assessment process for determining remaining asset life is subjective and a further subjective adjustment factor is introduced for SICA2B, pSICA and pSICA3; however, unwanted variation from this subjectivity is significantly suppressed by categorising the results into five condition categories. The peer review process by the HQ Signalling Principles Engineer provides an independent check on the accuracy of the resulting SICA scores against experience. We believe that M10 should have an accuracy grade of 3.

Traction power incidents causing train delays (M11 & M12)

- 1.2.30 **Performance – AC traction power incidents (M11).** For 2004/05, the result was 71. Over the last three years there has been a decrease the number of incidents; the result for this year shows a 10.1% improvement on 2003/04.
- 1.2.31 **Performance – DC traction power incidents (M12).** For 2004/05, the result was 13; the result shows a 60.6% improvement on 2003/04 driven by a significant improvement by South East Territory.
- 1.2.32 **Regulatory target.** The regulatory target for this measure has been met.
- 1.2.33 **Reliability grade.** The definitions for these measures are clearly documented. A single documented process has been followed to collect and report these measures. The process of correctly identifying the root cause of incidents attributed to traction power components is not a simple process and the number of minutes attributed to a delay is known to be a subjective process. We believe that M11 and M12 should have a reliability grade of B.
- 1.2.34 **Accuracy grade (M11).** The process is not sufficiently robust to ensure that the number reported incidents is absolutely correct; due to the small total of AC power incidents reported, only a single incident incorrectly attributed would impact the results by more than 1%. We believe that M11 should have an accuracy grade of 2.

- 1.2.35 **Accuracy grade (M12).** The number of conductor rail component incidents reported for M12 is insufficiently large to support an assessment of the accuracy of this measure. We believe that M12 should have an accuracy grade of X.

Electrification condition – AC traction feeder stations & track sectioning points (M13)

- 1.2.36 **Performance.** The extrapolated average condition score for year-end 2004/05 was 1.4. There has been an improvement over the last four years; however, the condition of assets assessed in each year may not be representative of the underlying population, so this is not necessarily showing a year-on-year improvement in the condition of the asset base. This improvement in average asset condition in 2004/05 is driven by a high proportion of the assets assessed as having a condition grade of 1 (ie good condition) this year in comparison with previous years. The average age of assets assessed in 2004/05 was 19.7 years in comparison with 25.9 years for the period 2000/1-2003/04. This may explain some of the improvement in the average condition score this year.
- 1.2.37 **Regulatory target.** The regulatory target for this measure has been met.
- 1.2.38 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subjective and the results are subject to extrapolation. We believe that M13 should have a reliability grade of B.
- 1.2.39 **Accuracy grade.** The process of condition assessment is subjective and the results are extrapolated across 9.3% of the assets which have not yet been assessed. Our samples show that the process as described was accurately followed this year. We believe that M13 should have an accuracy grade of 2.

Electrification condition – DC substations (M14)

- 1.2.40 **Performance.** The extrapolated average condition score for year-end 2004/05 was 1.8. There has been an improvement over the last three years; however, the condition of assets assessed in each year may not be representative of the underlying population, so this is not necessarily showing a year-on-year improvement in the condition of the asset base. This improvement in average asset condition is driven by a high proportion of the assets assessed in 2004/05 having a condition grade of 1 (ie good condition) in comparison with previous years. Insufficient data is available to test if the age profile of assets assessed this year might be a contributor to the increase in grade 1 assets.
- 1.2.41 **Regulatory target.** The regulatory target for this measure has been met.
- 1.2.42 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subjective and the results are subject to extrapolation. We believe that M14 should have a reliability grade of B.
- 1.2.43 **Accuracy grade.** The process of condition assessment is subjective and the results are extrapolated across 11.0% of the assets which have not yet been assessed. Our samples show that the process as described was accurately followed this year. We believe that M14 should have an accuracy grade of 2.

Electrification condition – AC traction contact systems (M15)

- 1.2.44 **Performance.** The extrapolated average condition score for year-end 2004/05 was 1.7. In 2004/05, there has been no change in the average condition score.
- 1.2.45 **Regulatory target.** The regulatory target for this measure has been met.
- 1.2.46 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subjective and the results are subject to extrapolation. We believe that M15 should have a reliability grade of B.

- 1.2.47 **Accuracy grade.** The process of condition assessment is subjective and the results are extrapolated across 83.1% of the asset population which has not yet been assessed. Our small number of samples show that the process as described was accurately followed this year. We believe that M15 should have an accuracy grade of 3.

Electrification condition – DC traction contact systems (M16)

- 1.2.48 **Performance.** The average condition score for all assets assessed by year-end 2004/05 was 1.9. The results reported for measure M16 have previously remained constant since 2000/01 at 1.8. This stability is not surprising as only 26% of South East Territory conductor rail wear measurements included within the measure have been undertaken since 2000. A large proportion of the information reported for this measure is based upon old wear measurements, extrapolated to reflect an estimate of current wear.
- 1.2.49 **Regulatory target.** The upper statistical tolerance for the regulatory target has been met.
- 1.2.50 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subject to extrapolation. We believe that M16 should have a reliability grade of B.
- 1.2.51 **Accuracy grade.** The calculation of wear is largely extrapolated using historic wear rates for different rail types and estimated levels of wear for when the dates of wear measurements have been lost. The condition grade is directly based on this extrapolated data. We believe that M16 should have an accuracy grade of 3.

Track Renewal Volumes (M20, M21, M22, M25)

- 1.2.52 **Performance.** There has been a steady rising trend for non-WCRM track renewal (rail, sleepers and ballast) from 2000/02-2003/04 which has been stabilised or reversed in 2004/05; rail renewals have decreased by 8.8% this year. Non-WCRM S&C renewals have risen by 216% over the last four years and by 48% this year. This is due to a change in Network Rail's asset management practices for S&C over this period.
- 1.2.53 **Regulatory target.** There are no regulatory targets for these measures.
- 1.2.54 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. There are known minor issues with the definitions used in the WCRM Programme Control System which has required some estimation of data. We believe that the track renewals measures (M20, M21, M22, M25) should have a reliability grade of B.
- 1.2.55 **Accuracy grade.** There are known minor issues with the data due the definitions used in the WCRM Programme Control System and possible inaccuracies from the MIMS codes used for maintenance volumes; however, the majority of data has been reported with a high degree of accuracy by the MP&I track renewals team. We believe that the track renewals measures (M20, M21, M22, M25) should have an accuracy grade of 2.

Signalling Renewal Volumes (M24)

- 1.2.56 **Performance.** WCRM is delivering 56% of the signalling equivalent units renewed in 2004/05, driving a 45.3% increase in total SEUs renewed in comparison with last year. The number of renewed SEUs on the non-WCRM network is dropping while Network Rail develops its long-term renewals strategy for signalling; this is likely to be further developed as part of the forthcoming Signalling Interim Review.
- 1.2.57 **Regulatory target.** There is no regulatory target for this measure.
- 1.2.58 **Reliability grade.** The definition and procedure for this measure is clearly documented. However, the procedure this year has not been followed and an ad hoc and uncompleted process used in its place. We believe M24 should have a reliability grade of C.

- 1.2.59 **Accuracy grade.** The calculation of SEUs counts is open to interpretation and partial SEUs can easily be excluded from large schemes. Small renewal works delivering partial SEUs can also be missed. There is significant doubt regarding the accuracy of the data provided by WCRM and MP&I Signalling team. We believe M24 should have an accuracy grade of 4.

KPI 6 – Asset Stewardship Incentive Index (ASII)

- 1.2.60 **Performance.** This year, Network Rail has reported an ASII figure of 0.90, which is a significant improvement in comparison with 2003/04. This reflects an improvement in all of the constituent elements of the index but the largest influences were (a) structures and earthworks TSRs (b) track geometry (level 2 exceedences and track geometry standard deviations) and (c) electrification asset failures generating more than 500 cumulative minutes of delay.
- 1.2.61 **Regulatory target.** The regulatory target for this measure is set for the end of the control period (2008/09). Performance in 2004/05 would meet the regulatory target for the end of the control period.
- 1.2.62 **Reliability & Accuracy.** The confidence grade for the ASII is determined from those of its constituent parts. We have thus assigned a confidence grade of B3, based on the value of the signalling failures reported measure which has the lowest overall grade.

Annual Return Section 6 – Finance and Efficiency

- 1.2.63 **Renewals Variance.** Network Rail has reported significant underspend (c.20%) against the non-WCRM renewals business plan spend intended for 2004. The largest elements of underspend relate to signalling and plant and machinery renewals – accounting for 57% of the total renewals underspend. We note that electrification and information technology also report significant percentage underspend (47% and 33% respectively) against their discipline budgets.
- 1.2.64 For signalling and electrification, we note that renewals expenditure underspend is largely attributed to deferrals due to delays in scheme design and development. This is supported at route level analysis with numerous schemes delayed pending reassessment and negotiation of contract scopes.
- 1.2.65 Track renewals expenditure is reported as approximately £19m underspent, however at route level, variances in aggregate indicate underspend at route level of £98m, offset by overspends of £30m. Centrally held budgets for expected efficiency and central overheads were significantly overspent – reporting a £47m overspend.
- 1.2.66 Similarly, telecoms expenditure is reported as some £30m below budget in total, however budget variance is principally related to centrally controlled schemes with over budget expenditure of some £17m offset by under expenditure of £46m largely due to lags in project implementation.
- 1.2.67 **Maintenance Variance.** This year saw the completion of taking maintenance in house by Network Rail. Network Rail has reported total expenditure of £1,271m, consistent with 2003/04 expenditure levels. Variance against budget is reported as minimal in total and at Territory level. As with renewals expenditure, this masks significant underlying variances. We sampled the underlying data for LNE indicating total positive and negative variances of some £25.5m.
- 1.2.68 **Regulatory target.** There is no regulatory target for expenditure reconciliation.
- 1.2.69 **Reliability & Accuracy.** We have assigned a confidence grade to the data reported for maintenance, track, signalling, telecoms and electrification renewals of B2 for total expenditure; and a confidence grade of B3 to disaggregated route expenditure reporting. We are undertaking a separate study of Network Rail's renewals expenditure variance reporting which will further inform this initial assessment.

1.3 Confidence grades and results against targets

- 1.3.1 The ORR Access Charges Review 2003 reset targets for Control Period 3 (2004/05-2008/09); the targets for 2004/05 shown in Figure 1.3.1 are further described in our audit commentaries in Section 5 of this report.
- 1.3.2 The targets in Figure 1.3.1 have a statistical tolerance ascribed to take account of random variation and (where appropriate) sampling errors. These tolerances were set as part of the ORR Access Charges Review 2000. Since then, the quality of data collection and the length of the dataset have increased significantly, which we would generally expect to have led to a reduction in the size of the tolerances. We have recommended that these tolerances are recalculated for the next Annual Return.
- 1.3.3 The colour coding in Figure 1.3.1 is based on the targets and tolerances:
- Red: outside nominal target and its statistical tolerance (target missed);
 - Yellow: within the statistical tolerance band for the target (target achieved);
 - Green: inside the nominal target and its statistical tolerance (target achieved).
 - Grey: no regulatory target set.

Measure	Confidence Grade	2004/05 Target	2004/05 Result
Broken rails (M1)	A1		
Defective rails – isolated defects (M2)	B4		
Defective rails – continuous defects (M2)	B4		
Track geometry – standard deviation data (M3)	A1	12 targets	All 12 met
Track geometry – poor track geometry (M3)	A1		
Track geometry – speed band data (M3)	A1		
Condition of asset temporary speed restrictions (M4)	B2	≤1,199 ±tba ≤6,089±tba	942 4,622
Track geometry – level 2 exceedences (M5)	A1	≤1.11±7%	0.91
Signalling failures (M9)	B2	≤28,098±7.3%	24,950
Signalling asset condition (M10)	B3	≤2.5±0.1	2.5
AC traction power incidents causing delay (M11)	B2	≤107±28%	71
DC traction power incidents causing delay (M12)	BX	≤30±47%	13
AC electrification condition FS/ TSP (M13)	B2	≤2.1±0.1	1.4
DC electrification condition (M14)	B2	≤2.3±0.1	1.8
AC traction contact system condition (M15)	B3	≤1.8±0.1	1.7
DC traction contact system condition (M16)	B3	≤1.8±0.1	1.9
Activity volumes: track (M20, M21, M22, M25)	B2		
Activity volumes: signalling (M24)	C4		
Finance and Efficiency Section: aggregate data	B2		
Finance and Efficiency Section: route-based data	B3		
Asset Stewardship Incentive Index (ASII)	B3		

Figure 1.3.1 Confidence grades targets and results for measures in Annual Return 2005

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3 Introduction

3.1 Background

3.1.1 As part of the Office of Rail Regulation's Periodic Review of Network Rail's Access Charges for Control Period 2 (2001-2006), a number of changes were implemented to improve information reporting arrangements through modifications to Network Rail's network licence. In summary, Network Rail was required:

- (a) To prepare more detailed regulatory accounts which are consistent with the basis on which the price controls are established;
- (b) To ensure that enhancement expenditure is separately reported alongside information on those enhancements implemented;
- (c) To appoint Reporters (chosen by the Regulator in consultation with Network Rail) to provide an independent assessment of the robustness of Network Rail's information submissions; and,
- (d) To provide an Annual Return (plus some monthly returns) to report data for the previous year and compares this with both historical data and baselines underlying the periodic review.

3.1.2 In accordance with these requirements, Network Rail now produces an Annual Return which contains measures of operational performance, asset condition and serviceability, renewals volumes, network capability, customer reasonable requirements, a reconciliation of the forecast expenditure set out in the Business Plan against actual expenditure and other performance indicators by agreement.

3.1.3 Halcrow was appointed as one of two Reporters on 8th October 2002 and is described as 'Reporter A'. The role of Reporter A is split into two parts:

- (a) Part A: To report to the Rail Regulator on part of Network Rail's Annual Return; this role is shared with Reporter B;
- (b) Part B: To report to the Rail Regulator on Network Rail's Asset Register.

3.1.4 In respect of Part A, Halcrow has previously been responsible for reporting on all the Annual Return measures specific to four geographical Regions and for two HQ-only indicators.

3.2 The 2004/05 year

3.2.1 2004/05 is the first year of Control Period 3, which covers the years 2004/05-2008/09, in respect of the determination of Network Rail's funding requirements and baseline outputs in ORR's Access Charges Review 2003.

3.2.2 During the 04/05 year, Network Rail has reorganised: (a) moving from a geographical organisational structure to a functional structure and (b) in-sourcing maintenance activity which was formerly contracted to Infrastructure Maintenance Companies (IMCs).

3.2.3 At the core of this functional reorganisation is the creation of an Engineering Directorate, Maintenance Directorate, Major Project & Investment (MP&I) Directorate, Operations & Customer Services (O&CS) Directorate and Safety & Compliance Directorate. In broad outline, the Engineering Directorate is responsible for specifying and budgeting for the assets; Maintenance Directorate is responsible for maintaining the assets; MP&I Directorate is responsible for delivering asset renewals projects; O&CS Directorate is responsible for train service delivery and other services for customers. This functional structure is integrated by a series of key meeting forums, information systems and documentation, including standards, procedures and work instructions; performance is monitored internally using structured Monthly Business Review.

- 3.2.4 The change in organisation has made it necessary to reallocate responsibilities between the Reporters in respect of their Part A duties, as specified by Office of Rail Regulation and Network Rail. This year, therefore, Halcrow is responsible, on a national basis, for reporting on eighteen measures, principally covering track, signalling, electrification and telecoms, plus the asset stewardship incentive indicator (ASII) and the business plan reconciliation for these four asset classes.

3.3 This report

- 3.3.1 This report is Reporter A's Final Report on Network Rail's Annual Return 2005 in respect of the 2004/05 financial year.
- 3.3.2 A programme of audits took place in May, June and July 2005 at the offices of Network Rail's Headquarters, Territories and Areas as appropriate. At each audit, the personnel responsible for the collection and collation of the data for each measure were interviewed and the data collection systems, written documentation and supporting data made available were reviewed.
- 3.3.3 In order to gain the most value from the audit programme, the audit scope and any data requests for individual meetings were developed by our Reporting Team in advance of the audits and provided to Network Rail where appropriate.
- 3.3.4 The following areas were covered during the audit of the Annual Return.
- (a) A review of the quality of the process by which the Annual Return 2005 has been compiled, including identifying the procedures used by Network Rail to measure, collect, prepare, analyse and report data and information;
 - (b) An audit of the numerical data presented in the tables in the Annual Return 2005 comprising, on a sample basis, checks of the methods used by Network Rail for collating the reported data and examination of the audit trail from the data presented in the tables in the Annual Return to the source of the data to verify the reliability and accuracy of the data. Evidence has been collected to support this audit process where necessary;
 - (c) Identification of assumptions that have been made, confirmation of why these have been made and reporting on assumption justification and any material impact on the figures reported.
 - (d) An assessment of the reported data against the regulatory targets.
 - (e) A review of the commentaries associated with each table in the Annual Return 2005;
 - (f) A review of the appropriateness of the confidence grades assigned by Network Rail to each measure;
 - (g) An examination of changes in data and performance from previous years' Annual Return data and identification of any material trends.
- 3.3.5 The audit programme was structured as follows:
- (a) Initial HQ audits w/c 28 March 2005;
 - (b) HQ audits w/c 06 June 2005;
 - (c) Territory & Area audits w/c 06 June 2005.
- 3.3.6 The details of all meetings and site visits attended by the Reporting Team are shown in Appendix A to this report.

4 Assessment of compliance

4.1 Compliance with requirements

Access to information and timing

- 4.1.1 Under the terms of our contract, Network Rail are obliged to provide full access to data, information and personnel required for our Reporting Team to carry out their audit.
- 4.1.2 We can confirm that we received the necessary co-operation from Network Rail in organising and attending meetings and providing information necessary for preparation of our report.
- 4.1.3 We note, however, that due to the timing of the audits, not all the data and evidence was available for some measures prior to or during the audit meetings. For this Final Report we have received all of the data and evidence requested, except for data from the Area Defect Databases in support of measure M2 (Rail Defects) which could not be sourced due to insufficient user knowledge within Network Rail's Area teams.

Audit organisation and preparation

- 4.1.4 Due to the new functional organisation of Network Rail, audits were not organised as coordinated visits to Regional headquarters, as in previous years. This has meant (a) audit meetings have been organised individually between the auditor(s) and auditee(s) rather than coordinated by Network Rail personnel at each location and (b) our Reporting Team has had to be more flexible in its travelling arrangements. However, the organisation of the audits with HQ, Territory and Area personnel has been good with minor exceptions.
- 4.1.5 The extent of preparation for audits varied considerably between Network Rail personnel. In some audits it was clear that there had been significant preparation, with copies of the reported figures, local procedures, and in some cases, supporting audit trails provided before or at the meetings. In other cases, the preparation was much less complete.
- 4.1.6 This year, the LNW Electrification & Plant team demonstrated best practice in this respect, by presenting all of its evidence on a data projector directly accessing the working documents and databases residing on their file server. This gave the auditors confidence regarding the provenance of the data and some of the processes used to collect, store and report the data.
- 4.1.7 As Network Rail's organisation is now functional, the reporting of data between the Areas and Territories and HQ was much more diverse in both timing and in mechanism than in previous years. This has meant (a) our audits were sometimes undertaken at the same time as collation of the data and (b) the formal approval of data using "sign-off" sheets is no longer coordinated by a single manager (formerly at the Regional level) as a control mechanism for the onwards reporting of data to HQ. In comparison with previous years, these two factors have required our Reporting Team to be much more proactive in ensuring that the data requested from Network Rail, before and after our audits, is provided in a timely and complete manner.
- 4.1.8 **Process Recommendation 1.** We recommend that, early in each calendar year, the HQ Champions and Reporter should formally agree a deadline by which time the Annual Return data should be expected by all parties to be finalised and available for audit.

4.2 Regulatory targets

- 4.2.1 For the measures on which Reporter A is reporting this year, Figure 4.2.1 shows Network Rail's performance against the regulatory targets reported in the Annual Return.
- 4.2.2 The ORR Access Charges Review 2003 reset targets for Control Period 3 (2004/05-2008/09); the targets for 2004/05 are further described in our audit commentaries in Section 5 of this report. The targets have a statistical tolerance ascribed to take account of random variation and (where appropriate) sampling errors. These tolerances were set as part of the ORR Access Charges Review 2000.
- 4.2.3 The colour coding in Figure 4.2.1 is based on the targets and tolerances:
- Red: outside nominal target and its statistical tolerance (target missed);
 - Yellow: within the statistical tolerance band for the target (target achieved);
 - Green: inside the nominal target and its statistical tolerance (target achieved).

Measure	01/02 result	02/03 result	03/04 result	CP2 target	04/05 target	04/05 result
Track geometry – national standard deviations (M3)						
35mm Top 50%	62.4	61.9	62.4	>64.6%	>62.4% ±tba	66.0%
35mm Top 90%	89.4	88.9	89.2	>90.3%	>89.2% ±tba	90.9%
35mm Top 100%	97.1	97.0	97.0	>98.3%	>97.0% ±tba	97.7%
35mm Alignment 50%	73.6	74.6	72.7	>70.9%	>72.7% ±tba	76.9%
35mm Alignment 90%	93.1	93.6	92.9	>91.6%	>92.9% ±tba	94.1%
35mm Alignment 100%	96.3	96.7	96.5	>97.4%	>96.5% ±tba	97.0%
70mm Top 50%	61.9	62.2	63.6	>62.5%	>63.6% ±tba	67.7%
70mm Top 90%	92.5	92.1	92.4	>92.8%	>92.3% ±tba	93.6%
70mm Top 100%	95.6	95.2	95.3	>97.8%	>95.3% ±tba	96.2%
70mm Alignment 50%	80.0	80.9	79.5	>64.7%	>79.5% ±tba	82.8%
70mm Alignment 90%	96.0	96.2	95.8	>91.9%	>95.8% ±tba	96.9%
70mm Alignment 100%	97.4	97.5	97.2	>97.3%	>97.2% ±tba	98.0%
Condition of asset TSRs (M4) (Number & Severity)	n/a	1308	1199	n/a	≤1,199 ±tba	942
	n/a	6169	6089	n/a	≤6,089±tba	4,622
Track geometry – level 2 exceedences (M5)	1.351	1.179	1.113	<1.820	≤1.11 ±7%	0.91
Signalling failures (M9)	27,905	29,013	28,098	<25,106	≤28,098 ±7.3%	24,950
Signalling asset condition (M10)	2.3	2.4	2.4	2.5	≤2.5 ±0.1	2.5
AC traction power incidents causing delay (M11)	107	102	79	<88	≤107 ±28%	71
DC traction power incidents causing delay (M12)	30	32	33	<45	≤30 ±47%	13
AC electrification condition FS/ TSP (M13)	2.1	2.1	1.9	1.9	≤2.1 ±0.1	1.4
DC electrification condition substation (M14)	2.2	2.3	2.1	1.9	≤2.3 ±0.1	1.8
AC traction contact system condition (M15)	1.9	1.8	1.8	1.7	≤1.8 ±0.1	1.7
DC traction contact system condition (M16)	1.8	1.8	1.8	1.8	≤1.8 ±0.1	1.9

Figure 4.2.1 Performance against regulatory targets for measure reported on by Reporter A

- 4.2.4 Network Rail has out-performed nearly all of the new targets set in the ORR Access Charges Review 2003.
- 4.2.5 **Process Recommendation 2.** The quality of data collection and the length of the dataset have increased since the ORR Access Charges Review 2000. We would generally expect this to have led to a reduction in the size of the tolerances required. We recommend that the tolerances are recalculated for the next Annual Return.

4.3 Confidence grades

- 4.3.1 Figure 4.3.1 shows the confidence grades our Reporting Team have assigned to describe the reliability and accuracy of the data in the 2005 Annual Return using the OFWAT grading system. Details of the OFWAT grading system are set out in Appendix B of this report.
- 4.3.2 We have worked with Network Rail to assign confidence grades to each measure in the Annual Return. Our assessments are based on our audit findings which are described for each measure in Section 5 of this report.
- 4.3.3 These confidence grades may change during each audit cycle due to (a) changes in the methodology for collecting and reporting each measure and (b) each cycle adding to our understanding of Network Rail's reporting processes, allowing a more comprehensive application of the confidence grading system. These grades should be viewed in conjunction with the individual audit reports and commentaries in Section 5 to understand any variations in data quality year-on-year.
- 4.3.4 While Reporters A and B have used the same confidence grading system as set out in the OFWAT system, the grades arrived at are dependent on the specific analysis, level of audit and investigation carried out; therefore, differing grades between the two Reporters may be partially due to these differences rather than fully attributable to variances between the reliability and accuracy of the data.

Measure	2005 Confidence Grade
Broken rails (M1)	A1
Defective rails (M2)	B4
Track geometry – national standard deviation data (M3)	A1
Track geometry – poor track geometry (M3)	A1
Track geometry – speed band data (M3)	A1
Track geometry – level 2 exceedences (M5)	A1
Temporary speed restrictions (M4)	B2
Signalling failures (M9)	B2
Signalling asset condition (M10)	B3
AC traction power incidents causing delay (M11)	B2
DC traction power incidents causing delay (M12)	BX
AC electrification condition FS/ TSP (M13)	B2
DC electrification condition (M14)	B2
AC traction contact system condition (M15)	B3
DC traction contact system condition (M16)	B3
Activity volumes: track (M20, M21, M22, M25)	B2
Activity volumes: signalling (M24)	C4
Finance and Efficiency Section: aggregate data	B2
Finance and Efficiency Section: route-based data	B3
Asset Stewardship Incentive Index (ASII)	B3

Figure 4.3.1 Confidence grades for the measures in Annual Return 2005

- 4.3.5 **Process recommendation 3.** We would expect the mission critical measures to have higher levels of confidence. We recommend that ORR and Network Rail should agree target confidence grades for each measure for future Annual Returns and that Network Rail should develop Action Plans for achieving these levels of data reliability and accuracy for each measure.

5 Audit report and commentary

5.1 Number of broken rails (M1)

Audit scope

- 5.1.1 These audits were undertaken to assess the reliability and accuracy of data reported in Network Rail's Annual Return 2004/05, Section 3, Broken Rails (M1), including Table 37.
- 5.1.2 The measure reports the number of broken rails. A broken rail either has a fracture through the full cross section or has a piece broken from it exceeding 50mm in length.
- 5.1.3 The definition and procedures for this measure are documented in RT/ARM/M1DF (issue 3) and RT/ARM/M1PR (issue 5).
- 5.1.4 Audits were undertaken at Network Rail Headquarters and sample Areas in each Territory: North East Area for LNE Territory, West Coast South Area for LNW Territory, Scotland West Area for Scotland Territory, Wessex Area for South East Territory and West Country Area for Western Territory.

Commentary on reported data

Regulatory target

- 5.1.5 The regulatory target for broken rails set in ORR's Access Charges Review 2003 is "no more than 300 broken rails pa within two years". We have interpreted this as meaning the number of broken rails reported for the period 2005/06 to 2008/09 should be no greater than 300 per annum.
- 5.1.6 As no target has been explicitly identified in the Access Charges Review 2003 for M1 Broken Rails in 2004/05, it is instructive to assess this year's performance against the baseline level recorded in 2003/04, ie 334 broken rails per annum.
- 5.1.7 322 broken rails were reported for 2004/05 which is better than performance in 2003/04.

Trends

- 5.1.8 Figure 5.1.1 shows the number of rail breaks for 2004/05 has continued the downward trend of this measure since 2000/01. The result for 2004/05 is a 3.6% improvement on 2003/04.

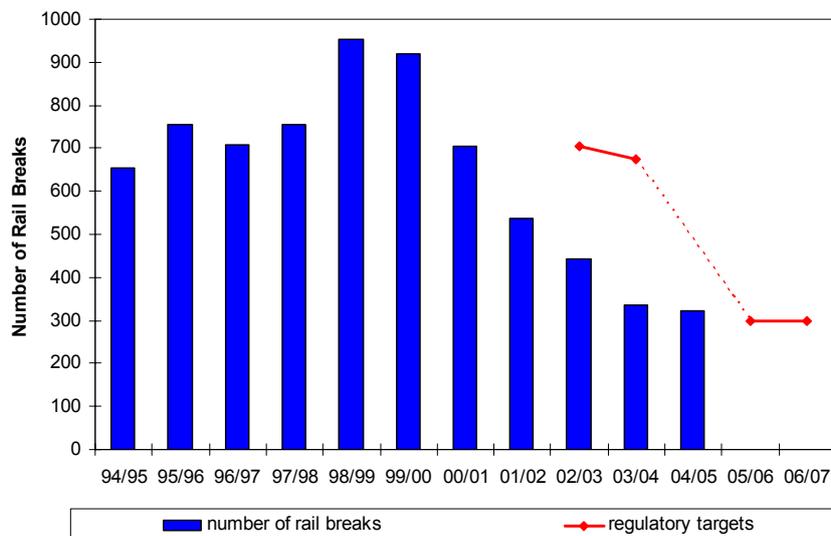


Figure 5.1.1 Number of broken rails (M1)

- 5.1.9 Despite the national downward trend in the number of broken rails reported, Figure 5.1.2 shows a slight increase in the numbers from 2003/04 in two Territories, LNE and South East. Historical numbers have been restated for the new Territory boundaries.

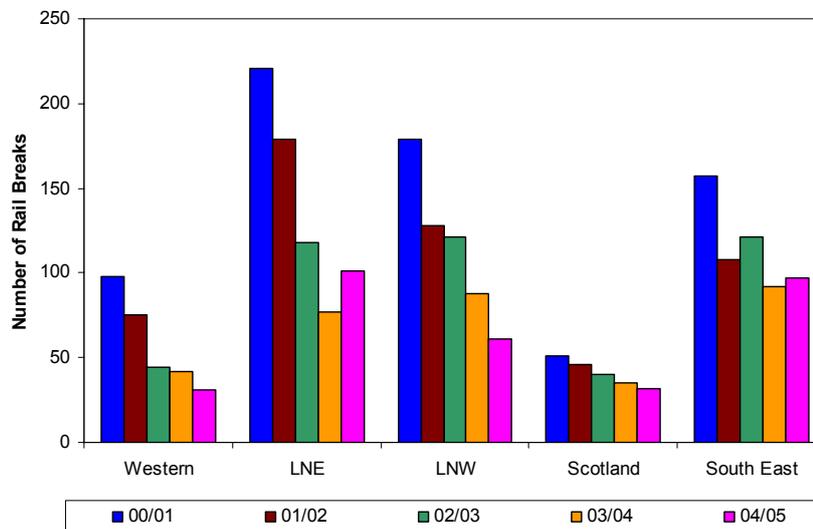


Figure 5.1.2 Number of broken rails by Territory

- 5.1.10 Within South East Territory, only West Anglia Line and Wessex contributed to the increase in broken rails. West Anglia Line reported 20 broken rails in 2004/05, up from 17 in 2003/04. Wessex had 43 broken rails reported, increasing from 30 reported in 2003/04. A six-sigma team has been investigating the potential issues influencing this increase. Initial findings of the study have shown potential issue to be: (a) lighter rail within this Area, (b) jointed track within this Area, and (c) introduction of new rolling stock in November 2004, which coincides with the highest month of broken rails (12 in period 9). These initial findings would appear to be reasonable explanations for the increase.
- 5.1.11 All Areas within LNE have shown an increase of reported broken rails. The Area we audited, North Eastern, had 44 broken rails reported, increasing from 32 reported in 2003/04. Both the Area Track Engineer and the National Rail Management Engineer has stated that this increase is due to the increase in tonnage on the freight lines in the Area.
- 5.1.12 Engineers in the remaining Areas audited, all of which reported fewer broken rails in 2004/05 than in 2003/04, believed that the improvement has been because of the improvement in testing technology (Sperry stick and Ultrasonic test train) and the ongoing effect of re-railing and grinding programmes.

Audit findings

- 5.1.13 During the 04/05 year, Network Rail has reorganised: (a) moving from a geographical organisational structure to a functional structure and (b) in-sourcing maintenance activity which was formerly contracted to Infrastructure Maintenance Companies (IMCs).

Process

- 5.1.14 The process is similar to that used in previous years for this measure.
- 5.1.15 When broken rails were identified on the network, they were recorded at an Area level using a broken rail incident form. The details of each rail break were entered into the Area Defect Database and in many areas also entered into a parallel running spreadsheet. In previous years, these Area Defect Databases were developed, owned and operated by the IMCs. When the maintenance organisations were in-sourced from the IMCs, the Defect Databases were also transferred; this means that Network Rail currently has a diverse set of Defect Databases across its Areas.

- 5.1.16 Every 4 weeks, data from the Area Defect Databases was uploaded to Raildata, this year using an upload script rather than hand-keying. The data from Raildata was used by the National Reporting Team to populate the Railfail database.
- 5.1.17 In parallel, details of broken rails reported in the daily national control log were also recorded by the National Reporting Team in the 'Broken Rail Information' spreadsheet.
- 5.1.18 Every 4 weeks, the National Engineering Reporting Manager instigated a check by Territory Rail Management Engineers to reconcile the data in the Broken Rail Information spreadsheet and the data in the Area Defect Databases and to formally confirm the number of breaks.
- 5.1.19 Once any discrepancies between the Broken Rail Information spreadsheet and the data in the Area Defect Databases were resolved, the National Engineering Reporting Manager stored the details of each rail break in the HQ Railfail database.
- 5.1.20 The HQ Railfail was used to generate 4-weekly Period KPI Reports and the data at year end for the Annual Report.

Accuracy of reported data

- 5.1.21 At each sample Area, we matched the location and date of broken rail incident forms with the records in the Area Defect database.
- 5.1.22 For each sample Area, we matched the number of broken rail incident forms with the number of records in the Area Defect database and the number of broken rails in the year-end Broken Rail KPI report for 2004/05 Period 13 (ie the number of broken rails in the HQ Railfail database) and the number of broken rails in the Annual Return 2004/05.
- 5.1.23 It is interesting to note that Network Rail's use of two parallel reporting systems to confirm the number of broken rails is necessary, as neither system – as currently used – is accurate on its own for the purposes of 4-weekly reporting. This is caused by the lag of time between discovery of a broken rail and its entry into the defect database and successful upload to Raildata. Figure 5.1.3 shows the initial level of data discrepancy between the two data sources prior to the 4-weekly reconciliation process undertaken by the Territory and Area engineers.

Data Source	Data Store	Broken Rails initially reported	Over-reported (incorrectly reported as broken rail)	Under-reported (discrepancy between the two systems)	Actual Total Broken Rails in HQ Railfail Database
Control log	Broken Rail Info Sheet	363	+64	-23	322
Incident form & Area Defect Database	Raildata	240	+0	-82	

Figure 5.1.3 Initial number of recorded broken rails prior to reconciliation

- 5.1.24 In our opinion, the use of two parallel systems is unnecessary, as the Area Defect Databases and Raildata are capable of being used and managed to provide a robust information system for the purposes of 4-weekly reporting.

Assessment of confidence grade

- 5.1.25 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure. The process is closely managed and the figures internally reported on a daily, 4-weekly and annual basis. We believe that M1 should have a reliability grade of A.

- 5.1.26 **Accuracy grade.** Two parallel systems are used to identify broken rails for this measure and a reconciliation process is used to increase accuracy. The process would have to misreport four broken rails or more in 2004/05 to have an inaccuracy of 1% or higher; our assessment is that the accuracy of this process would not allow this level of misreporting. We believe that M1 should have an accuracy grade of 1.

Audit Statement

- 5.1.27 We have audited the data presented in the Annual Return for Number of Broken Rails (M1). We can confirm the data has been collected in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of A1. The regulatory target for this measure has been met.

Recommendations arising

- 5.1.28 **M1 Recommendation 1.** We recommend that the use of two parallel systems (Control Logs/ Broken Rail Information Sheet and Area Defect Databases/ Raildata) for reporting the number of broken rails is reviewed.

5.2 Number of rail defects (M2)

Audit scope

- 5.2.1 These audits were undertaken to assess the reliability and accuracy of data reported in Network Rail's Annual Return 2004/05, Section 3, Rail Defects (M2), including Tables 38-41.
- 5.2.2 The measure reports the number of rail defects. A defective rail is a rail which is not broken but has another fault requiring remedial action to make it fit for purpose in accordance with Network Rail standards. Rail defects are reported as either isolated defects or continuous defects.
- 5.2.3 The definition and procedures for this measure are documented in NR/ARM/M2DF (issue 4) and NR/ARM/M2PR (issue 5) respectively.
- 5.2.4 Audits were undertaken at Network Rail Headquarters and sample Areas in each Territory: North East Area for LNE Territory, West Coast South Area for LNW Territory, Scotland West Area for Scotland Territory, Wessex Area for South East Territory and West Country Area for Western Territory.

Commentary on reported data

Regulatory target

- 5.2.5 There is no regulatory target for M2 rail defects.

Trend

- 5.2.6 In 2004/05, the number of isolated defects was 30,778, which is 1.6% fewer defects than in 2003/04; the length of continuous rail defects was 2,423,367 yards, which is 18.7% more defects than in 2003/04.
- 5.2.7 For the last four years the reported data for rail defects from the previous year has been subsequently restated (corrected) in the Annual Return. The analysis that follows includes trends of both subsequently restated data and initially reported data, as the reported data for 2004/05 is (as yet) uncorrected.
- 5.2.8 **Isolated Rail Defects.** Figure 5.2.1 shows the number of isolated defects reported in the Annual Return. The performance for 2004/05 shows 1.6% fewer defects than the initially reported figure for 2003/04 but shows 14.0% more defects than the subsequently restated figure for 2003/04. Both the initially reported and subsequently restated figures show a decreasing number of isolated defects over last three data points. Introduction of a new storage and reporting system in 2005/06 is expected to produce more reliable data for isolated rail defects.
- 5.2.9 **Continuous Rail Defects.** Figure 5.2.2 shows the length of continuous defects reported in the Annual Return. The performance for 2004/05 shows 18.7% more defects than the initially reported figure for 2003/04 but 5.5% fewer defects than the subsequently restated figure. Both the initially reported and subsequently restated figures show an increase in the length of continuous defects over the last three data points. Introduction of a new storage and reporting system in 2005/06 is expected to produce more reliable data for continuous rail defects next year.

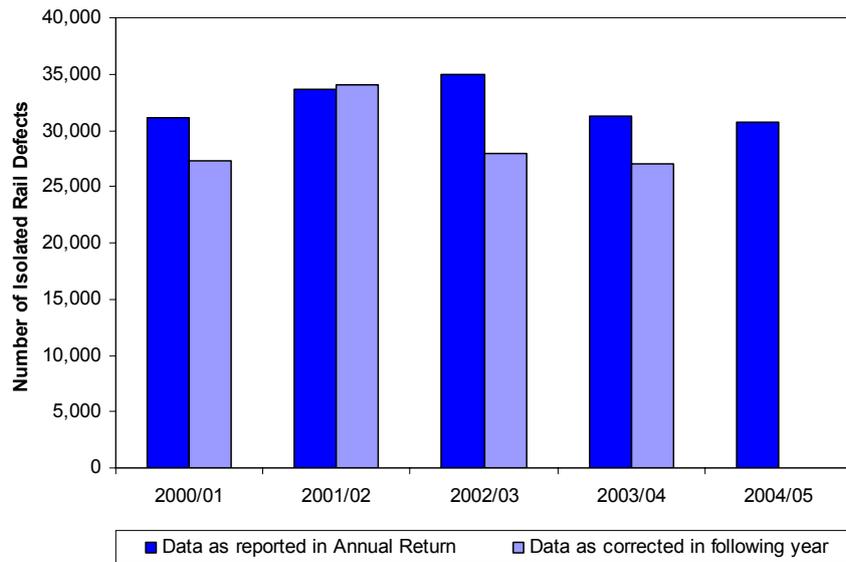


Figure 5.2.1 Numbers of isolated rail defects (M2)

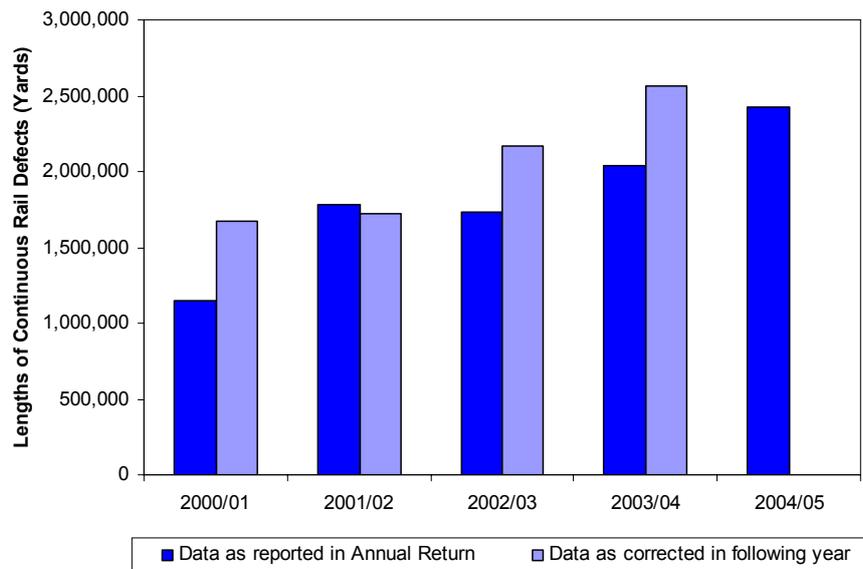


Figure 5.2.2 Length of continuous rail defects (M2)

Audit Findings

- 5.2.10 During the 04/05 year, Network Rail has reorganised: (a) moving from a geographical organisational structure to a functional structure and (b) in-sourcing maintenance activity which was formerly contracted to Infrastructure Maintenance Companies (IMCs).

Area process

- 5.2.11 The methods of data collection for this measure are by ultrasonic non-destructive inspection and visual inspection. When a defect is identified it is recorded on a standard inspection form.

- 5.2.12 Four of our sample areas used pedestrian ultrasonic units ('Sperry walking sticks') as the primary method of inspection; these areas also used results from an Ultrasonic test train, which is being trialled across the network.
- 5.2.13 Our fifth sample area, West Coast South in LNW Territory, is the first Area to use the Ultrasonic test train as the primary method of inspection. The suspected defects identified by the test train are verified by walking stick inspection. This significantly reduces the number of hours the inspection personnel are on the track.
- 5.2.14 **Rolling Contact Fatigue (RCF) continuous rail defects.** Results from the inspection forms for RCF defects are entered onto a variety of Area RCF tracking systems. Every 4 weeks the Areas forward this RCF data to the Territory Rail Management Engineer who compiles this data in a standard RCF defect spreadsheet, which is forwarded to the National Engineering Reporting Team for storage.
- 5.2.15 **Isolated defects and other continuous rail defects.** Details of these defects are entered into the Area Defect Database. The Areas use these databases throughout the process of defect management from identification to remediation. As each system was developed separately for the IMCs, each one has different built-in functionality for asset management; however, all the systems inspected provided reports for the ages of defects and the defects overdue for remediation.
- 5.2.16 Figure 5.2.3 shows the variety of different Area Defect Databases in operation at our sample areas.

Sample Area	Territory	Defect Database	Former IMC owner of Defect Database
Scotland West	Scotland	Tardis	First Engineering
North East	LNE	Railfail	Jarvis
West Country	Western	Railflaws	Carillion & Amey
West Coast South	LNW	Railflaws	Carillion
Wessex	South East	RAMs	Balfour Beatty

Figure 5.2.3 Defect databases in sample areas

- 5.2.17 In all Areas except West Coast South, data from the inspection forms are entered into the Area Defect Database by personnel in the Depots rather than the Area office. For 2004/05, the data for all rail defects except RCF defects was sourced from the Area Defect Databases and uploaded to an HQ database, Raildata.
- 5.2.18 The Area Defect Databases were modified in 2004/05 to allow for electronic uploads to Raildata; in previous years, data was hand-keyed into Raildata. The upload scripts are run by each Area's Defect Database operator, and the data sent to HQ in a text file. This file is validated by a module in Raildata before its data is accepted. The validation process includes checking each record's defect location against ELR information from GEOGIS (Network Rail's master referencing system for rail information). The Defect Database operator receives an email confirming the file has been received and a list of the records rejected. The operator corrects and resubmits the rejected records if the reason for its failure is apparent; there are no actions in the procedure describing what the operator should do if a record cannot be uploaded.
- 5.2.19 We have found that many of the sample Areas did not have technical knowledge of the Area Defect Databases and their underlying code. This knowledge was previously held at a regional level of the IMC's IT departments and has been mostly lost due to the insourcing of maintenance. Some of this knowledge has been recaptured during development of the upload script for Raildata; however this knowledge has not been transmitted to end users, who have little understanding of what is happening within the "black box" and were therefore often unable to fully utilise the functionality of the Area Defect Databases.

HQ process

- 5.2.20 Every four weeks, the National Engineering Reporting Manager obtains a download from Raildata. This data is checked and corrected if required. These checks and corrections included: (a) identify and remove duplicate entries; (b) identify and remove non-reportable records; (c) identify and remove RCF records as these are reported separately. The data is then categorised by type of defect and reported in the Periodic Defective Rail KPI report.
- 5.2.21 Every four weeks, the RCF data received from the Territories is checked and corrected as above and reported in the Periodic Defective Rail KPI report.
- 5.2.22 At the end of the reporting year, the National Engineering Reporting Manager ensures the data from the Period 13 Defective Rail KPI report is formally signed off by Territory Track Engineers for RCF defect data and by the National Rail Management Engineer for the other defect data.
- 5.2.23 Procedurally, there is no requirement for the defect data to be signed off by the Areas, who are the actual owners of the defect data; however, most of the sample Areas we audited had been approached by the Territory for comment on the defect numbers to be signed-off.

Accuracy of reported data

- 5.2.24 We sought evidence of an audit trail from data collection in the sample areas through to the figures reported in the annual report. We did this by (a) comparing sample inspection forms with the Area Defect Databases; (b) comparing totals from Area Defect Databases with Raildata; (c) comparing totals from Raildata with the published Annual Return.

Sampling

- 5.2.25 Samples of twelve inspection reports were inspected at each sample Area and compared to the records in the Defect Databases. All samples inspected were completed in accordance with the procedure and had been entered correctly into the databases.
- 5.2.26 At each of the sample areas, we requested a dump of the raw 2004/05 rail defect data from the Area Defect Database; however this wasn't possible at the audit meetings due to download errors or non-availability of personnel with knowledge of the databases. This information was formally requested from Network Rail. West Country and Scotland West provided alternative pre-defined reports but were unable to provide the raw data requested. The raw data from West Coast South was insufficient to allow comprehensive analysis and the raw data from Wessex was mixed with raw data for Kent and Sussex and could not be readily analysed.
- 5.2.27 During the Area audits we found a variance between the data in the Area Defect Databases and data in the Annual Return, as shown in Figure 5.2.4. This variance may be due to:
- (a) An error in the upload process leading to duplicate records in Raildata, possibly caused when existing records are amended in the Area Defect Database; this is the likely cause of the variance for Scotland West and West Country;
 - (b) An error in the upload process caused by the validation of records; personnel at North East suggested a mismatch between ELR location data in the Area Defect Database and ELR location data in GEOGIS meant that 4% of their records were rejected by Raildata;
 - (c) The local report used for our analysis being of poor accuracy or reliability; for a number of reasons, it is possible that the local reports did not produce the data we required for this analysis;

- 5.2.28 Without the raw data files, we have not been able to verify the discrepancies detailed in Figure 5.2.4 nor have we been able to determine the reasons for these discrepancies, as outlined in the paragraph above. However, the Area Defect Databases are an integral part of the defect management process; Engineers in each sample Area were confident regarding the accuracy of the defect data within their database and our sample audit concurred with this assertion.

Areas	Isolated defects (year end)		Variance (positive values are a possible over-report in Annual Return)	Method of obtaining data from Area Defect Database
	Area Defect Database	Defective Rail KPI Report (P13)		
Scotland West	3,758	4,951	+24%	Local report from Defect Database
North East	1,350	1,299	-4%	Raw data dump of defect records
West Country	2,676	3,307	+19%	Local report from Defect Database
Wessex/ Kent/ Sussex	n/a	221	n/a	Raw data dump of defect records
West Coast South	n/a	3,387	n/a	Raw data provided but insufficient for analysis.

Figure 5.2.4 2004/05 isolated rail defects from Area Defect Databases and Annual Return

- 5.2.29 During our audit at Network Rail HQ, we compared the data in the Period 13 Defect Rail KPI report and isolated rail defects data files from Raildata. There was a variance ranging from 0% to 4.6% for the Area figures. This discrepancy was due to the data correction carried by National Engineering Reporting Manager in producing the Defective Rail KPI report (paragraph 5.2.21). The corrections were all justified.

Raildata Completeness

- 5.2.30 At the request of Network Rail, we repeated the completeness audit of Raildata mandatory fields which we undertook in a previous report (*Raildata Audit (R03)*, January 2005). The mandatory fields are those identified as "Always" required in Table 1 (Structure of the Rail Failure Database System) of Network Rail's *Rail Failure Handbook (RT/CE/S/057)*. Figure 5.2.5 gives the completeness statistics for the mandatory fields in Raildata for each territory at the end of 2004/05.
- 5.2.31 We expected 100% completeness for the mandatory fields in Raildata, enforced by the validation routines in the electronic upload process. However, the network total is 82% completeness. We can only conclude the validation process does not successfully enforce completion of all mandatory fields.

Assessment of confidence grade

- 5.2.32 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure; however, there is no mechanism within the procedure for the data owners (the Area track engineers) to sign-off the data reported in the Annual Return. Data correction has been required at the start of each reporting year for the last four years, including for 2004/05. We believe that M2 should have a reliability grade of B.
- 5.2.33 **Accuracy grade.** We have concerns regarding the level of data correction required at the start of the 2004/05 reporting year and the accuracy of the Raildata upload process. We believe that M2 should have an accuracy grade of 4.

ID	Mandatory Field	Territories					Network Average
		LNE	WES	SEA	LNW	SCO	
1	Record Identifier	100%	100%	100%	100%	100%	100%
3	Engineering Line Reference	100%	100%	100%	100%	100%	100%
4	Track Identity	100%	100%	100%	100%	100%	100%
5	Location at/ from	100%	100%	100%	100%	100%	100%
7	Rail (Left or Right)	100%	100%	100%	100%	100%	100%
10	PSR or ESR imposed	39%	45%	94%	23%	2%	32%
15	Failure Type	99%	100%	100%	100%	57%	91%
16	Classification Code	97%	100%	100%	98%	99%	98%
17	Date first observed	100%	100%	100%	100%	100%	100%
18	Discovery Method	100%	91%	100%	94%	95%	95%
19	Date last tested	35%	83%	96%	56%	98%	69%
20	Latest test type	28%	31%	97%	15%	93%	44%
26	Rail Description	100%	87%	100%	87%	33%	79%
27	Rail Year	72%	92%	84%	75%	26%	67%
28	Rail steel grade	37%	90%	91%	70%	29%	60%
29	Rail profile	93%	98%	94%	91%	31%	80%
30	Rail maker	74%	92%	79%	82%	27%	70%
Average Completeness		81%	89%	96%	82%	70%	82%

Figure 5.2.5 Completeness of mandatory fields in Raildata 2004/05

Audit Statement

- 5.2.34 We have audited the data presented in the Annual Return for Number of Rail Defects (M2). We can confirm the data has been collected in accordance with the relevant definition and procedure. We have however, noted a number of concerns in our audit report. The data has been assessed as having a confidence grade of B4. The nominal target for the number of isolated defects has been met; the nominal target for the length of continuous rail defects has not been met; the tolerance bands for these targets have not yet been set but are likely to be material.

Recommendations arising

- 5.2.35 **M2 recommendation 1.** We remain concerned as to the accuracy of data reported and the extent of 'data refreshes' at the start of each year for the M2 measure which has directly led to the confidence grade of B4. We recommend that Network Rail review the process of collecting and reporting the M2 measure to identify the need for data refreshes and take steps to eliminate these causes where practicable. An action plan to improve the confidence grade should be produced and agreed with ORR and the Reporter.
- 5.2.36 **M2 recommendation 2.** We recommend that the script for uploading and validating data from the Area Defect Databases to Raildata is altered to enforce the mandatory fields specified in Network Rail's *Rail Failure Handbook* (RT/CE/S/057).

5.3 Track geometry (M3 & M5)

Audit scope

- 5.3.1 These audits were undertaken to assess the reliability and accuracy of data reported in Network Rail's Annual Return 2004/05, Section 3 for Track geometry:
- National standard deviation data (M3) including Table 42. National standard deviation (SD) data is expressed in terms of the percentage of track within the 100% ('poor' or better), 90% ('satisfactory' or better) and 50% ('good') bands for four track geometry parameters.
 - Poor track geometry (M3) including Table 43. This index is calculated using the national SD data results for four track geometry parameters together with the percentage of track defined as 'very poor' or 'super-red'.
 - Speed band data (M3), including table 44. This is distribution of standard deviation values by national speed bands for different track geometry bands.
 - Level 2 exceedences (M5), including table 45. Level 2 exceedences are distortions in track geometry identified for short lengths of track using the 35m wavelength measurements.
- 5.3.2 The definition and procedures for these measures are documented in NR/ARM/M3DF (issue 4), NR/ARM/M5DF (issue 3) and NR/ARM/M3PR (issue 4).
- 5.3.3 These measures use a common data collection process; we have therefore audited and reported on these measures together. Audits were undertaken at Network Rail Headquarters and the Engineering Support Centre at Derby.

Commentary on reported data

Regulatory target

- 5.3.4 The regulatory target for M3 track geometry for 2004/05 to 2008/09 (Control Period 3) is set in ORR's Access Charges Review 2003; the target is to maintain the network at or below the baseline level recorded in 2003/04.

National standard deviation data (M3)

- 5.3.5 Figure 5.3.1 shows the regulatory targets in numerical form and a comparison of the targets for Control Period 2 (CP2) and Control Period 3 (CP3). This re-baselining has caused little change in the targets except for the 70m alignment (horizontal deviation) 50% parameter, which has increased by 14.8%.

Geometry parameter	35m Top (Vertical Deviation)			35m Alignment (Horizontal Deviation)			70m Top (Vertical Deviation)			70m Alignment (Horizontal Deviation)		
	50%	90%	100%	50%	90%	100%	50%	90%	100%	50%	90%	100%
New (CP3) regulatory target	62.4%	89.2%	97.0%	72.7%	92.9%	96.5%	63.6%	92.3%	95.3%	79.5%	95.8%	97.2%
Old (CP2) regulatory target	64.6%	90.3%	98.3%	70.9%	91.6%	97.4%	62.5%	92.8%	97.8%	64.7%	91.9%	97.3%
% change	-2.2%	-1.1%	-1.3%	1.8%	1.3%	-0.9%	1.1%	-0.5%	-2.5%	14.8%	3.9%	-0.1%

Figure 5.3.1 Regulatory targets for national standard deviation data

5.3.6 The track geometry results for the 2004/05 reporting year are presented in Figure 5.3.2.

Geometry parameter	35m Top (Vertical Deviation)			35m Alignment (Horizontal Deviation)			70m Top (Vertical Deviation)			70m Alignment (Horizontal Deviation)		
	50%	90%	100%	50%	90%	100%	50%	90%	100%	50%	90%	100%
Results for 2004/05	66.0%	90.9%	97.7%	76.9%	94.1%	97.0%	67.7%	93.6%	96.2%	82.8%	96.9%	98.0%
Regulatory target	62.4%	89.2%	97.0%	72.7%	92.9%	96.5%	63.6%	92.3%	95.3%	79.5%	95.8%	97.2%
Result against target	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Figure 5.3.2 National SD data (M3)

5.3.7 All twelve of the new regulatory targets for M3 track geometry national standard deviation data were met in 2004/05.

Poor track geometry (M3)

5.3.8 There are no regulatory targets for poor track geometry.

Speed band data (M3)

5.3.9 There are no regulatory targets for speed band measures.

Level 2 Exceedences (M5)

5.3.10 The regulatory target for M5 track geometry for 2004/05 to 2008/09 (Control Period 3) is set in ORR’s Access Charges Review 2003; the target been set as “no more than 0.9 Level 2 exceedences per track mile within two years”.

5.3.11 As no target has been explicitly identified in the Access Charges Review 2003 for M5 L2 exceedences in 2004/05, it is instructive to assess this year’s performance against the baseline level recorded in 2003/04, ie 1.11 L2 exceedences per track mile.

5.3.12 0.9 L2 exceedences per track mile were reported for 2004/05 which is better than performance in 2003/04.

Trends

5.3.13 Following discussion with the National Rail Management Engineer, we believe that this improvement in track geometry is due to a shift in tamping practice from smoothing of areas of the network which are easy to access, which was often the practice of infrastructure maintenance companies, to a planned approach focusing on critical locations, such as S&C sites and tamping to a design alignment. This has reduced productivity of the tamping shifts, but has improved the resulting track geometry. This is consistent with other information obtained by the Reporter.

National standard deviation (SD) data

5.3.14 Figure 5.3.3 shows the national SD results for each of the twelve track geometry over the last five years. The results for 2004/05 for all twelve measures are at the highest level of track geometry level since 2000/01.

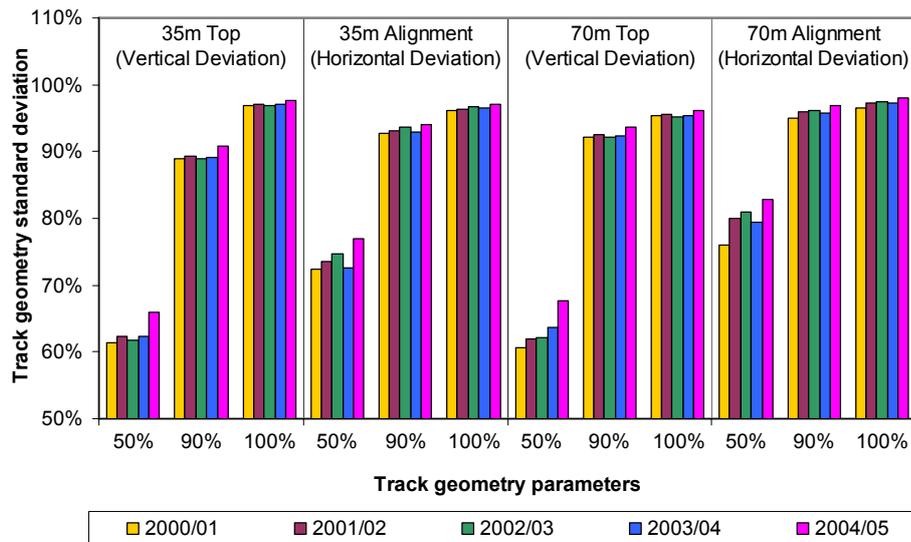


Figure 5.3.3 Track geometry standard deviation 2000/01 – 2004/05

Poor track geometry

5.3.15 For the second year, the Annual Return 2004/05 presents a measure of poor track geometry (PTG). This index is calculated using the national SD data results for each of the four track quality parameters together with the percentage of track defined as:

- (a) 'Very poor': track which fails to meet the 100% ('poor' or better) standard;
- (b) 'Super-red': track which exceeds the maximum standard deviation thresholds for the 35m vertical and horizontal alignments.

5.3.16 The trends for poor track geometry on each Route are shown in Figure 5.3.4; this shows a significant level of improvement this year, particularly for Anglia Route.

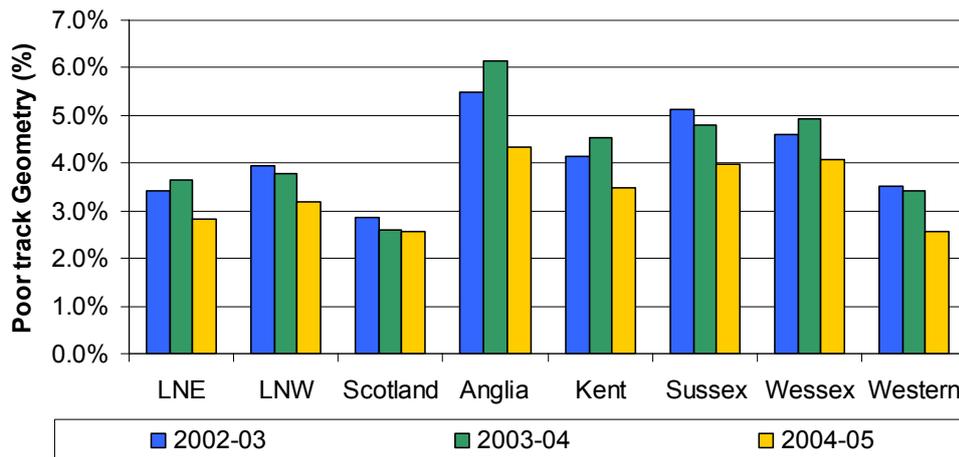


Figure 5.3.4 A comparison of Route PTG between 2002/03, 2003/04 and 2004/05

Speed band data

5.3.17 Figure 5.3.5 shows the overall SD results for each track geometry parameter against the speed bands for that parameter; there is a decrease for all measures this year compared with 2003/04, indicating better track geometry.

Track geometry parameter	Linespeed range(mph)	Overall SD at year-end (mm)					Variance (03/04 vs. 04/05)
		00/01	01/02	02/03	03/04	04/05	
35m Top	15-125	3.06	3.03	3.04	3.02	2.93	-0.09
	15-40	4.29	4.24	4.24	4.28	4.23	-0.05
	45-70	3.34	3.31	3.34	3.34	3.25	-0.09
	75-110	2.54	2.51	2.52	2.50	2.40	-0.10
	115-125	1.83	1.80	1.82	1.81	1.73	-0.08
35m Line	15-125	2.06	2.03	1.97	1.98	1.89	-0.09
	15-40	4.27	4.33	4.09	4.08	4.06	-0.03
	45-70	2.07	2.06	2.01	2.04	1.94	-0.10
	75-110	1.28	1.23	1.22	1.27	1.17	-0.10
	115-125	0.92	0.84	0.83	0.90	0.79	-0.11
70m Top	80-125	3.29	3.26	3.26	3.21	3.06	-0.14
	80-110	3.39	3.36	3.37	3.32	3.19	-0.14
	115-125	2.49	2.42	2.48	2.49	2.43	-0.06
70m Line	80-125	2.38	2.23	2.19	2.23	2.07	-0.15
	80-110	2.48	2.33	2.28	2.33	2.18	-0.14
	115-125	1.59	1.48	1.48	1.61	1.49	-0.12

Figure 5.3.5 Speed Band standard deviations

Level 2 Exceedences

5.3.18 Figure 5.3.6 shows that this year all Routes had the lowest level of Level 2 exceedences per track mile for the last four years.

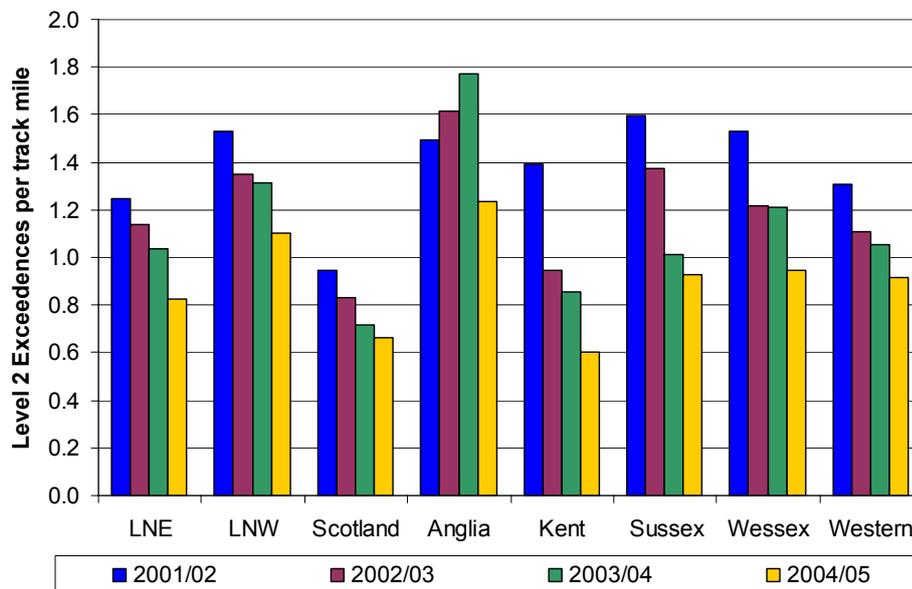


Figure 5.3.6 Level 2 exceedences for 2001/02 - 2004/05

Audit findings

- 5.3.19 The measurement of track geometry was taken in house during 2004/05. Network Rail have three track recording trains operating across the network which are programmed to run in accordance with the frequencies set out in the annual track measurement plan. The annual track measurement plan for 2004/05 was completed.
- 5.3.20 The track recording trains are calibrated every six months and a validation test run is conducted on a control section of track where the condition is known. This year, all validation tests were successful for each vehicle.
- 5.3.21 On completion of the recording run, the information was downloaded from the train's recording system and uploaded to a local database system at the Engineering Support Centre in Derby. A team of analysts compared traces from every run with traces from previous runs on that line to identify any unexpected changes which may have indicated errors in the data. The machines were regularly changed over and the resulting checks of the traces provided a validation of accuracy.
- 5.3.22 Once the data had been checked by the analysis team, the standard deviations for each eight of a mile were uploaded to the Track Quality Main Frame (TQMF). From the TQMF, the National Track Geometry Analyst extracted the latest data to produce the four-weekly track geometry reports. The reports were checked for irregularities within the data and if explanation was required, the National Track Geometry Analyst would contact the Engineering Support Centre. Reports were distributed to the Territory and Area track engineers who used the information for developing track maintenance programmes.
- 5.3.23 The Engineering Support Centre also provides track geometry information directly to some Area track engineers, who require the information on a more regular basis; one such Area is West Coast South, where changes in the track geometry are monitored on a weekly basis due to the particular demands for track quality on the West Coast Mainline.
- 5.3.24 At the end of the year, the annual track geometry report was produced by the National Track Geometry Analyst and passed to the National Track Geometry and Gauging Engineer for sign-off.
- 5.3.25 We visited the Engineering Support Centre in Derby to verify the process described and inspected the database used by the National Track Geometry Analyst.

Assessment of confidence grade

- 5.3.26 **Reliability grade.** The definition for this measure is clearly documented. The procedure is clearly defined and is well controlled. The collection and reporting of this measure is a closely managed process which has been in operation for a number of years. We believe that both M3 & M5 should have reliability grades of A.
- 5.3.27 **Accuracy grade.** The data shows considerable consistency between measurement runs; the calculations are subject to checking. We believe that both M3 & M5 should have accuracy grades of 1.

Audit Statement

- 5.3.28 We have audited the data presented in the Annual Return for Track Geometry (M3 and M5). We can confirm the data has been collected in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of A1 for both measures.

Recommendations arising

- 5.3.29 There are no recommendations arising from our audit findings this year.

5.4 Condition of asset temporary speed restriction sites (M4)

Audit scope

- 5.4.1 This audit was undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Condition of asset temporary speed restriction sites (M4), including Tables 46-48.
- 5.4.2 The measure reports:
- (a) The total number of emergency speed restrictions (ESRs) and planned temporary speed restrictions (TSRs) arising from the condition of track, structures and earthworks, in place for 4 weeks or more;
 - (b) The total 'severity scores' for planned TSRs and ESRs (jointly referred to as 'TSRs'), which are derived using an algorithm based upon the length, duration and speed limit imposed compared with the prevailing line speed.
- 5.4.3 The measure is a proxy for the condition of the assets and the quality of Network Rail's asset stewardship. The impact of TSRs on train performance is not reflected.
- 5.4.4 The definition and procedures for this measure are documented in RT/ARM/M4DF (issue 5) and RT/ARM/M4PR (issue 6) respectively.
- 5.4.5 The audit was undertaken at Network Rail Headquarters only, reflecting the centralised collection and reporting method for this measure.

Commentary on reported data

Regulatory target

- 5.4.6 The regulatory target for M4 condition of asset temporary speed restriction sites for 2004/05 to 2008/09 (Control Period 3) is set in ORR's Access Charges Review 2003; the target is "annual reduction required" which we have interpreted as a requirement to maintain the network at or below the baseline level recorded in 2003/04.
- 5.4.7 In numerical terms, the regulatory target is therefore:
- (a) Number of sites not greater than 1,199;
 - (b) Severity score not greater than 6,089.
- 5.4.8 Tolerances have not been ascribed to these targets by Network Rail.
- 5.4.9 In 2004/05, there were 942 condition of asset TSRs on the network reportable for this measure with a total severity score of 4,622, bettering the target by 21% for the number of sites and by 24% for severity score.

Trends

- 5.4.10 Figure 5.4.1 shows the reported TSRs are dominated by track-related faults, accounting for 90.0% of the total number and 95.6% of the total severity score.
- 5.4.11 Figure 5.4.2 shows the number of TSRs caused by earthworks and structures has improved significantly, by 56% and 28% respectively. The severity of TSRs caused by earthworks also showed significant improvement this year, by 51%. Network Rail has plausibly attributed this to improvements in weather conditions and changes in the asset management regime.

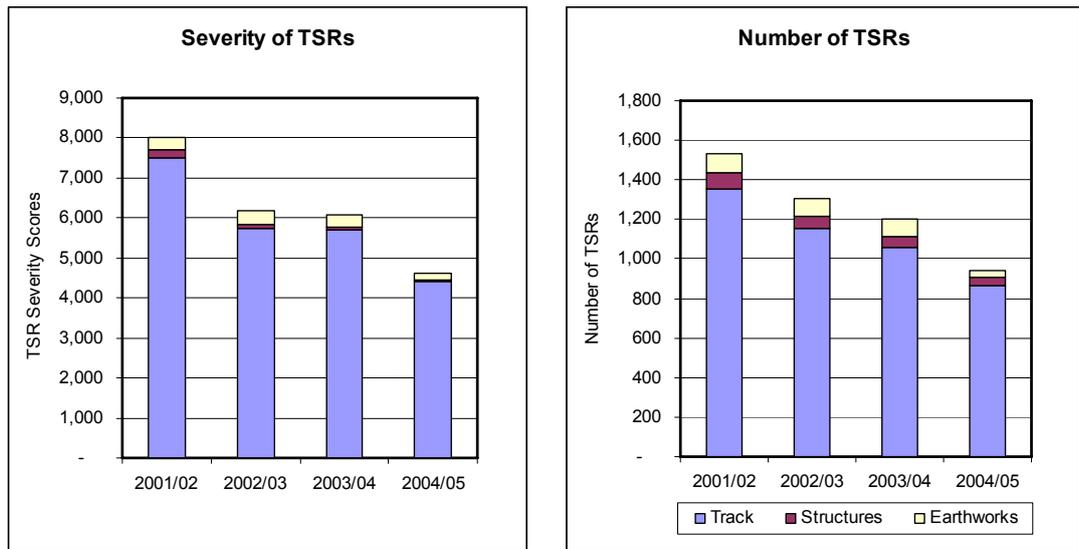


Figure 5.4.1 Number and severity of temporary speed restrictions (M4)¹

Measure (M4)	Cause of TSR	Variance 02/03-03/04	Variance 03/04-04/05
Number	Track	-8%	-18%
	Structures	-9%	-28%
	Earthworks	-11%	-56%
	Total	-8%	-21%
Severity Score	Track	-1%	-23%
	Structures	-42%	-17%
	Earthworks	0%	-51%
	Total	-1%	-24%

Figure 5.4.2 Variance in Severity Score and Number of TSRs (M4)

5.4.12 More geographically-detailed analysis is less easy than in previous years due to mergers and boundary changes; however, by grouping some of the former Regions and present Territories it is possible to create comparable datasets with similar geographical boundaries. Using these datasets, Figure 5.4.3 and Figure 5.4.4 show:

- (a) The improvement this year in the number of TSRs has been driven by South East and Western Territories with 43% and 35% improvements respectively;
- (b) The improvement this year in severity scores has been driven by South East, Scotland and Western Territories with improvement of 69%, 54% and 35%.

5.4.13 These improvements appear to be due to Network Rail's on-going focus on improving train performance through improved asset management.

¹ The definition of this measure was subject to change between 2001/02 and 2002/03.

Former Region/ Present Territory	2002/03	2003/04	2004/05	Variance
East Anglia & Southern/ South East	200	215	122	-43%
Great Western/ Western	193	199	130	-35%
LNE & MD & NW/ LNE & LNW	756	703	612	-13%
Scotland/ Scotland	159	82	78	-5%
Total	1308	1199	942	-21%

Figure 5.4.3 Number of temporary speed restrictions (M4)

Former Region/ Present Territory	2002/03	2003/04	2004/05	Variance
East Anglia & Southern/ South East	484	530	166	-69%
Great Western/ Western	868	908	591	-35%
LNE & MD & NW/ LNE & LNW	4389	4410	3756	-15%
Scotland/ Scotland	428	241	111	-54%
Total	6169	6089	4624	-24%

Figure 5.4.4 Severity of temporary speed restrictions (M4)

Audit findings

5.4.14 The procedure RT/ARM/M4PR (issue 6) had not been up-dated to reflect the new organisation; however, its meaning is still easily understandable by readers.

Planned temporary speed restrictions

5.4.15 This year, the planned TSR data has largely been collected from PPS, the new possession planning system which went live in Week 37 of 2004.

5.4.16 Area Delivery Planning teams entered planned possessions and planned TSRs into PPS as they were planned and checked with each planned TSR owner before publication in the draft Weekly Operating Notice. Data from PPS is routinely used on a weekly basis by Area and Route managers to monitor asset management performance and delivery to customers and by senior managers in Monthly Business Reviews.

5.4.17 The raw data was extracted from PPS and allocated to the categories Track, Structures, Earthworks and Not Reportable using a lookup table for the 82 standardised categories in PPS describing the cause of a TSR. This lookup table was assessed and appeared to correctly extract raw data that meets the definition for M4.

5.4.18 Network Rail has a spreadsheet which contains algorithms for calculating the severity scores and number of planned TSRs from the raw data. This spreadsheet and its output were observed. The process for data checking was assessed; the checks are not detailed in the procedure for this measure (RT/ARM/04PR) but are presented in Appendix C to this report. These checks would appear to be sufficient to ensure that the number and severity of planned TSRs is correctly reported.

Emergency speed restrictions

- 5.4.19 The process for collecting Emergency Speed Restriction (ESR) data for some Routes was retrospective rather than being collected in a systematic manner at the time they occurred. Network Rail staff – and the HQ TSR Planner, in particular – appear to have made considerable effort to collate this data and check its accuracy. However, we are unable to exclude the possibility that some ESRs may have been missed.
- 5.4.20 The raw data for ESRs was not consistently collected in 2004/05 as it was not entered into PPS by all Areas. ESR data for each Route was collected as follows:
- (a) Anglia, Wessex, Kent and Sussex – analysis of WON and an investigation by HQ staff with Area delivery planning and maintenance teams;
 - (b) Scotland – ESR codes and start dates were entered into PPS;
 - (c) Western – a separate database was used to record ESRs;
 - (d) London North Eastern – a separate database was used to record ESRs;
 - (e) London North Western – analysis of WON and an investigation by HQ staff with Area delivery planning and maintenance teams; there were particular difficulties obtaining data for the former North West Region.
- 5.4.21 Similar to the process for planned TSRs, the raw data for ESRs was entered into a spreadsheet to calculate the severity scores and number of TSRs and similar checking procedures were undertaken.

Assessment of confidence grade

- 5.4.22 **Reliability grade.** The definition for this measure is clearly documented. The documented procedure does not fully reflect the new organisation but has been followed for collecting planned TSRs and for much of the ESR data; however, as noted above, some ESR data was not collected in accordance with the procedure. We believe that M4 should have a reliability grade of B.
- 5.4.23 **Accuracy grade.** The use of PPS as a data source has considerably improved the accuracy of the planned TSR data and some of the ESR data. The prime influences on accuracy have been (a) the high quality of planned TSR data which forms the majority of reportable TSRs and (b) the small impact of the lower quality ESR data from South East and LNW Territories. We believe that M4 should have an accuracy grade of 2.

Audit Statement

- 5.4.24 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for condition of asset temporary speed restriction sites (M4). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure, except for the collection of emergency speed restriction data on a minority of Routes which did not meet the requirements of RT/ARM/M4PR. The data has been assessed as having a confidence grade of B2.

Recommendations arising

- 5.4.25 **M4 recommendation 1.** The procedure RT/ARM/M4PR (issue 6) should be up-dated to reflect the change of organisation.
- 5.4.26 **M4 recommendation 2.** The procedure RT/ARM/M4PR (issue 6) and instructions to Area delivery planning teams should be up-dated to use PPS for recording ESRs on all routes, similar to current practice for planned TSRs.

5.5 Signalling failures (M9)

Audit scope

- 5.5.1 This audit was undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Signalling failures (M9), including Table 51.
- 5.5.2 This measure reports the total number of signalling failures that cause more than 10 minutes delay on Network Rail's infrastructure (referred to as 'signalling failures').
- 5.5.3 The definition and procedures for this measure are documented in RT/ARM/M9DF (issue 5) and RT/ARM/M9PR (issue 3).
- 5.5.4 This audit was undertaken at Network Rail Headquarters only, reflecting the centralised collection and reporting method for this measure.

Commentary on reported data

Regulatory target

- 5.5.5 The regulatory target for signalling failures set in ORR's Access Charges Review 2003 is to maintain the network at or below the baseline level recorded in 2003/04. In numerical terms, the regulatory target is not greater than 28,098 signalling failures per annum. This target is subject to a tolerance of $\pm 7.3\%$.
- 5.5.6 In 2004/05, there were 24,950 incidents attributed to signalling failures causing more than 10 minutes delay, which has met the less stringent regulatory target for Control Period 3.

Trend

- 5.5.7 Figure 5.5.1 shows performance against regulatory target; there has been an improvement of 3.2% in 2003/04 and an 11.2% improvement in 2004/05.

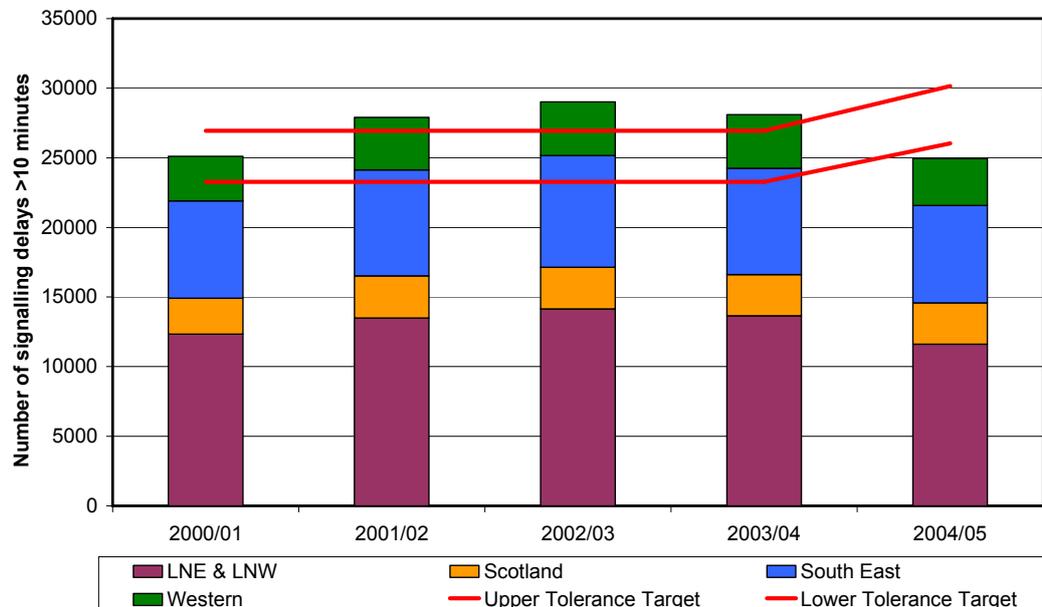


Figure 5.5.1 Number of signalling failures >10 minutes with regulatory target (M9)

- 5.5.8 More geographically-detailed analysis is less easy than in previous years due to mergers and boundary changes; however, by grouping some of the former Regions and present Territories it is possible to create comparable datasets with similar geographical boundaries. Using these datasets, Figure 5.5.2 shows the improvement has been driven by London North Western, London North Eastern and Western Territories.

Territory	2000/01	2001/02	2002/03	2003/04	2004/05	Variance
LNE & LNW	12,340	13,494	14,144	13,662	11,616	-15.0%
Scotland	2,578	3,025	2,988	2,948	2,968	0.7%
South East	6,983	7,610	8,043	7,641	6,993	-8.5%
Western	3,205	3,776	3,838	3,847	3,373	-12.3%
Total	25,106	27,905	29,013	28,098	24,950	-11.2%

Figure 5.5.2 Variance of signalling failures >10 minutes (M9)

- 5.5.9 As noted in last year's report and in the Annual Return commentary, this improving trend is likely to be due to bedding-in of new signalling equipment. For example, a programme of work to install TPWS (train protection warning system) equipment and HPSS switch and crossings produced a spike of failures due to the installation process and the operation/ maintenance of novel equipment. Improvements in 2004/05 are most likely to have been caused by empirically-based improvements in maintenance procedures.
- 5.5.10 The number of signalling failures per million train kilometres is also presented in the Annual Return as is a commentary on the downtime per failure. Neither of these statistics form part of measure M9 nor were they requested by ORR in the agreed Form and Content for the Annual Return 2004/05. They have not been subject to audit.

Audit findings

- 5.5.11 The procedure RT/ARM/M9PR (issue 3) had not been up-dated to reflect the new organisation; however, its meaning is still easily understandable by readers.
- 5.5.12 The data for this measure is sourced from TRUST (Train Running System), the rail industry's delay measurement and attribution system, using delay categories specified in the definition of the measure. Attribution is undertaken by trained staff; data quality is monitored by a process of supervision and spot-audit. Allocation of delay to a particular company and delay category is based on the Delay Attribution Guide (DAG) and the delay attributor's knowledge of the root cause.
- 5.5.13 In previous years, the procedure for this measure required that TRUST delay data is extracted every four weeks by Regional (now Route) staff and sent, via the HQ performance team, to the HQ Signalling team. This year the process has been simplified; at year end, an extract from TRUST was sourced by the HQ Business Engineering team and sent to the HQ Signalling team for reporting. This data was checked following the 42-day refresh of the TRUST system to incorporate any changes in the attribution of delay.
- 5.5.14 As noted in previous years, attribution of delay to signalling delay categories as defined in the DAG is not always appropriate for this measure, leading to a systematic over-reporting of signalling failures for measure M9; for example:
- Track faults which cause points failure are categorised as signalling failures even if there is no signalling fault. This is actually a successful detection by the signalling system, not a failure of the signalling system.
 - Track faults which cause track circuit failures are categorised as signal failures. Again, this is actually a successful detection by the signalling system, not a failure of the signalling system.

- 5.5.15 There is therefore a significant gap between the engineering view of delays caused by signalling faults and those recorded in TRUST. On this basis, the relative balance of effort and expenditure between assets in Network Rail's asset management system is likely to be incorrect if it is based on the level of delays each asset type imparts to customers, attributed using TRUST.

Assessment of confidence grade

- 5.5.16 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure. We believe that M9 should have a reliability grade of B.
- 5.5.17 **Accuracy grade.** The process of delay attribution is a subjective process often undertaken with considerable time pressure. Systematic errors introduced by the mismatch between the definition of this measure and the advice in the Delay Attribution Guide mean that this measure is over-reported but in a consistent manner. We believe that M9 should have an accuracy grade of 3.

Audit Statement

- 5.5.18 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for signalling failures (M9). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure except for minor shortcomings which have had no material impact. The data has been assessed as having a confidence grade of B3. The regulatory target for this measure has been met.

Recommendations arising

- 5.5.19 **M9 recommendation 1.** The procedure RT/ARM/M9PR (issue 3) should be up-dated to reflect the change of organisation.
- 5.5.20 **M9 recommendation 2.** The accuracy of data reported under this measure should be improved by reviewing the DAG in order to improve the attribution of delay; this review should seek to ensure that – as a matter of principle – attribution to delay categories is based on likely root-cause rather than on the first reported symptoms. This has been a recommendation in previous years.
- 5.5.21 **M9 recommendation 3.** The accuracy of data reported under this measure should be improved by organising the Area maintenance team or other appropriate person to check the attribution of delays for this measure; this check should confirm that delays attributed to signalling delay categories for this measure were indeed caused by failure of the signalling system, using Network Rail's fault management system (FMS) or other analysis of root-cause. This has been a recommendation in previous years.

5.6 Signalling asset condition (M10)

Audit scope

- 5.6.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Signalling asset condition (M10), including Table 52-53.
- 5.6.2 This measure assesses the condition of signalling assets, based on the residual life of equipment in a signalling interlocking area, using a methodology called Signalling Infrastructure Condition Assessment (SICA) which provides a condition grade from 1 to 5 where 1 is good condition and 5 is poor condition. SICA focuses on the interlocking and lineside equipment; it does not include level crossings, remote frames or ground frames.
- 5.6.3 The definition and procedures for this measure are documented in RT/ARM/M10DF (issue 5) and RT/ARM/M10PR (issue 3).
- 5.6.4 Audits were undertaken at Network Rail Headquarters, London North Eastern, London North Western, South East and Western Territories and by telephone and emailed information for Scotland Territory.

Commentary on reported data

Regulatory target

- 5.6.5 The regulatory target for signalling asset condition set in ORR's Access Charges Review 2003 is to maintain the network at or below the baseline level recorded in 2003/04. In numerical terms, the regulatory target is not greater than an average condition grade of 2.5. This target is subject to a tolerance of ± 0.1 .
- 5.6.6 In 2004/05, the average condition band was 2.5, which has bisected the upper and lower tolerance levels for the target (2.4 to 2.6) and therefore met the regulatory target for Control Period 3.

Trend

- 5.6.7 Figure 5.6.1 shows the trend for asset condition. For the last four years there has been a decrease in the number of assets in grade 2 (10-20 years life remaining) and equivalent increase in assets in grade 3 (3-10 years life remaining).

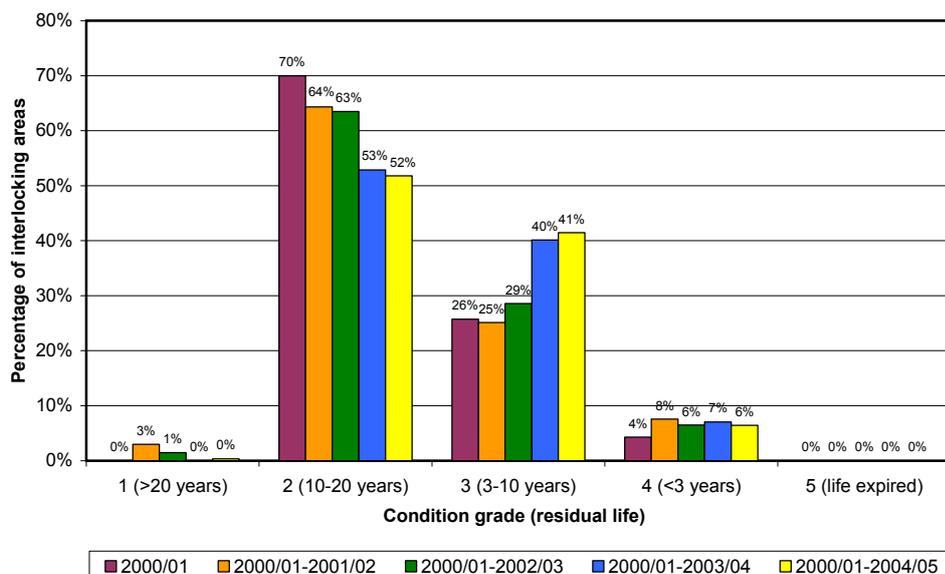


Figure 5.6.1 Average signalling asset condition (M10)

- 5.6.8 This condition profile of the signalling assets and the strategy for asset renewal is currently the subject of a Signalling Interim Review between ORR and Network Rail.
- 5.6.9 The HQ database which is audited each year on a sample basis by the Reporters is the only complete listing of SICAs and their scores. This database shows 1,510 interlockings have been assessed. Network Rail is currently developing a SICA Information System (SIS) to provide a more transparent data storage and reporting process.
- 5.6.10 The procedure requires Network Rail to assess 100% of interlockings by March 2006. The population of interlockings in each Region changes each year as signalling schemes are commissioned and old interlockings replaced. This year, Network Rail has also developed a new register of interlockings, stored as Interlocking Data Cards, which has led to the reclassification of some sub-interlockings as interlockings. There are currently 1,759 interlockings with separate Interlocking Data Cards.
- 5.6.11 As Figure 5.6.2 shows, 86% of interlockings have been assessed and 249 interlockings remain to be assessed in the 2005/06 year if the target is to be met, which appears to be easily achievable on all Territories except for LNE where a significant number remain to be assessed.

Territory	Interlocking population ²	Number assessed	Percentage assessed	Number still to be assessed
LNE	546	368	67%	178
LNW	390	383	98%	7
Scotland	172	169	98%	3
South East	368	315	86%	53
Western	283	275	97%	8
Total	1,759	1,510		249

Figure 5.6.2 Interlocking population and SICA assessments (M10)

Audit findings

- 5.6.12 The procedure RT/ARM/M10PR (issue 3) had not been up-dated to reflect the new organisation; however, its meaning is still easily understandable by readers.

SICA3

- 5.6.13 For 2004/05, condition assessments have been undertaken using SICA3, a new version of the methodology used in previous years. This version has been developed by Lloyd's Register for Network Rail. Similar to the previous version, SICA3 can be used to provide an overview of condition ('primary SICA3' or pSICA3) or a more detailed assessment of condition (a 'secondary SICA3' or sSICA3). This means that the current dataset of condition assessments has used five different methodologies – SICA2B, pSICA, sSICA, pSICA3 and sSICA3. Though SICA3 is an improvement, the diversity of assessment methods has reduced the reliability of the historical dataset.
- 5.6.14 One of our technical experts assessed the user manual, SICA3 tool and observed a SICA3 assessment being undertaken in Abergavenny (incl. line to Pontrilas and Tram Inn). We look forward to the opportunity to assess this tool in detail in a future year.
- 5.6.15 No training programme was provided for the roll-out of the SICA3 methodology; however, guidance was provided in a SICA Handbook. A SICA user group also supported assessors and provided a forum for discussion of the methodology. Elements of the methodology which might be subject to differing interpretations have been identified and discussed by assessors but a guidance note on these items has not yet been issued.

² Based on number of Interlocking Data Cards.

- 5.6.16 Assessment for Western Territory is outsourced; unfortunately, the experienced assessor for Western Territory was not included in the SICA user group, which could have adversely impacted the accuracy of results from Western and has reduced the pool of experience available to the SICA user group.

Collection

- 5.6.17 For 2004/05, assessments have been undertaken by assessors with experience in the SICA methodology. These assessors were Network Rail personnel except for assessments undertaken in Western Territory which were out-sourced, as noted above.
- 5.6.18 Following Network Rail's reorganisation, signalling renewal assessment engineers on each Territory were made responsible for managing the assessment process and undertaking assessments. Prior to the reorganisation, assessments were undertaken by personnel in a variety of posts.
- 5.6.19 Each Territory had a different process for review of the assessments and for checking/mentoring assessors. These processes were largely ad hoc and did not constitute a documented audit but provided a suitable level of internal check and oversight by experienced signalling engineers.
- 5.6.20 The HQ Signalling Principles Engineer undertook a peer review on a selection of interlockings approaching the end of their asset life on all Territories; we observed a number of these peer review reports. Whilst this was not a formal HQ audit of the SICA process it provided a suitable level of internal check and oversight by experienced signalling engineers.

Scope of SICA3 assessments

- 5.6.21 All Territories except Western Territory conduct a separate SICA3 assessment for each interlocking in compliance with the SICA3 guidance; Western Territory has conducted single assessments for each signalling control centre, so that one SICA3 report addresses the condition of more than one interlocking associated with that signalling control centre. This means that Western Territory is averaging the condition of its interlockings for a particular signalling control centre, which will lead to incorrect assessment of condition, especially where one interlocking on a signalling control centre is newly installed and the others are considerably older.

Reporting

- 5.6.22 SICA scores for assessments undertaken in 2004/05 were sent by Territory signalling renewal assessment engineers to the HQ signalling strategy engineer in a variety of spreadsheet formats. These scores were compiled into the HQ database which has been used for reporting purposes.
- 5.6.23 The scores of the SICA assessments undertaken this year by each Territory were checked against the HQ database; the scores were found to be correctly recorded. The calculations in the HQ database were checked and also found to be correct.
- 5.6.24 As for previous years, the HQ database adjusts some SICA scores, reducing the remaining asset life by 22.5% for interlockings assessed using SICA2B, pSICA and pSICA3. This factor is applied as Network Rail believes these assessment methods over-estimate the remaining asset life. Though this clearly reflects a precautionary approach, there is no documented evidence to support the level of adjustment. The adjustment factor is not recorded in the definition or procedure.

Assessment of confidence grade

- 5.6.25 **Reliability grade.** The definition for this measure is clearly documented. A documented process has been followed to collect and report this measure. However, five different assessment methodologies have been used over the last five years to contribute to the current average condition score. The SICA methodology utilises a subjective scoring system which has been rolled out without comprehensive training; however, the process has been undertaken by persons with suitable levels of expertise supplemented by documented guidance and oversight by others. We believe that M10 should have a reliability grade of B.
- 5.6.26 **Accuracy grade.** The assessment process for determining remaining asset life is subjective and a further subjective adjustment factor is introduced for SICA2B, pSICA and pSICA3; however, unwanted variation from this subjectivity is significantly suppressed by categorising the results into five condition categories. The peer review process by the HQ Signalling Principles Engineer provides an independent check on the accuracy of the resulting SICA scores against experience. We believe that M10 should have an accuracy grade of 3.

Audit Statement

- 5.6.27 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for signalling asset condition (M10). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of B3. The regulatory target for this measure has been met.

Recommendations arising

- 5.6.28 We note the many of the recommendations from previous years have been implemented or are in the process of being implemented. However, three priority recommendations made last year are reiterated below.
- 5.6.29 **M10 recommendation 1.** The procedure RT/ARM/M10PR (issue 3) should be up-dated to reflect the change of organisation.
- 5.6.30 **M10 recommendation 2.** The procedure and definition should be amended to document the current practice of applying adjustment factors to SICA2B, pSICA and pSICA3 scores. The documentation for M10 is deficient until this recommendation is completed.
- 5.6.31 **M10 recommendation 3.** The adjustment factor applied by HQ to residual lives identified by SICA2B, pSICA and pSICA3 should be further researched and documented to provide evidence for the level of the adjustment factor. This will improve accuracy for measure M10.
- 5.6.32 **M10 recommendation 4.** The historic data for this measure should be restated, reporting Great Western's SICA 2B assessments for the year in which they were undertaken. The reported data for M10 currently overstates the number of assessments undertaken in 2003/04.
- 5.6.33 **M10 recommendation 5.** We recommend that Network Rail should develop and roll-out a training course and associated competence management system for the SICA3 process. This should include a process for mentoring and checking SICA3 assessments.
- 5.6.34 **M10 recommendation 6.** We recommend that additional resources should be identified to complete the 178 remaining SICA assessments in LNE Territory.
- 5.6.35 **M10 recommendation 7.** We recommend that Western Territory (a) undertake separate assessments for each interlocking and (b) review the impact of undertaking single assessments for signalling control centres on its condition grades.

5.7 Traction power incidents causing train delays (M11 & M12)

Audit scope

- 5.7.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, traction power incidents:
- (a) Alternating current traction power incidents causing train delays (M11);
 - (b) Direct current traction power incidents causing train delays (M12).
- 5.7.2 These measures report the number of overhead line equipment (OLE) component failures (M11) and conductor rail component failures (M12) that lead to incidents causing greater than five hundred minutes delay. Both measures exclude incidents caused by defective train equipment, outside parties, vandalism, animals and those arising as a direct result of extreme weather. The measure also excludes incidents caused by failures of other electrification equipment in the power supply system.
- 5.7.3 The definitions and procedure for these measures are documented in:
- (a) RT/ARM/M11DF (issue 3);
 - (b) RT/ARM/M12DF (issue 3);
 - (c) RT/ARM/M11PR (issue 4).
- 5.7.4 These measures have a common procedure and data collection process; we have therefore audited and reported on these measures together. Audits were undertaken at Network Rail Headquarters and at London North Eastern, London North Western, Scotland and South East Territories. The London North Western Territory is responsible for reporting these measures for Western Territory.

Commentary on reported data

Regulatory target

- 5.7.5 The regulatory target for traction power failures set in ORR's Access Charges Review 2003 is to maintain the network at or below the baseline level recorded in 2001/02.
- 5.7.6 **M11.** In numerical terms, the regulatory target is not greater than 107 OLE component failures causing train delay. The statistical tolerance is $\pm 28\%$ of the target which forms a range from 77.0 to 137.0. For 2004/05, the result was 71 which met the less stringent regulatory target for Control Period 3.
- 5.7.7 **M12.** In numerical terms, the regulatory target is not greater than 30 conductor rail component failures causing train delay. The statistical tolerance is $\pm 47\%$ of the target which forms a range from 15.9 to 44.1. For 2004/05, the result was 13 which met the more stringent regulatory target for Control Period 3.

Trend

- 5.7.8 Figure 5.7.1 shows the trend for OLE component failures causing train delay; for the last three years there has been a decrease in the number of incidents. The result for this year shows a 10.1% improvement on 2003/04.
- 5.7.9 Figure 5.7.2 shows the trend for conductor rail component failures causing train delay. The result for this year shows a 60.6% improvement on 2003/04 driven by a significant improvement by South East Territory.

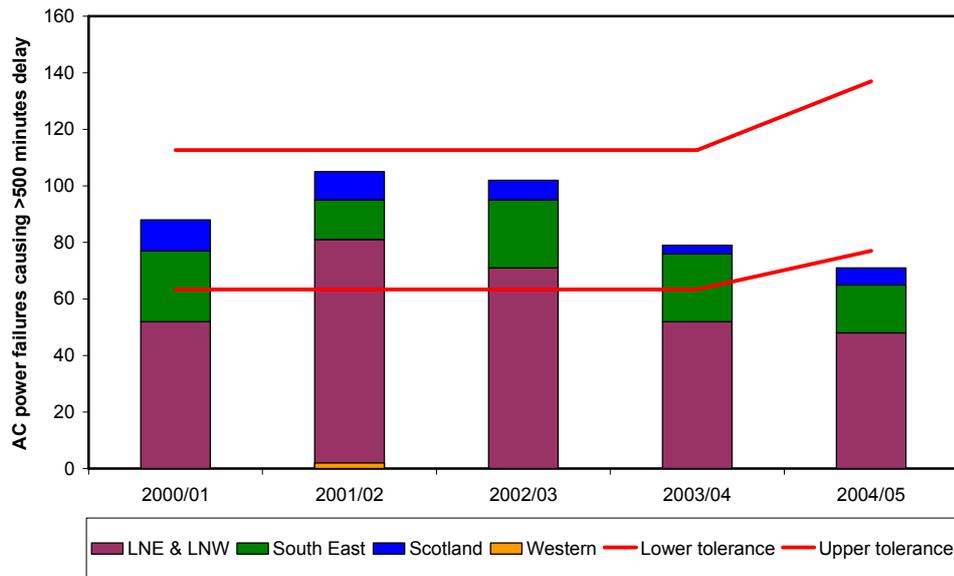


Figure 5.7.1 Number of AC power failures causing >500 minutes delay (M11)

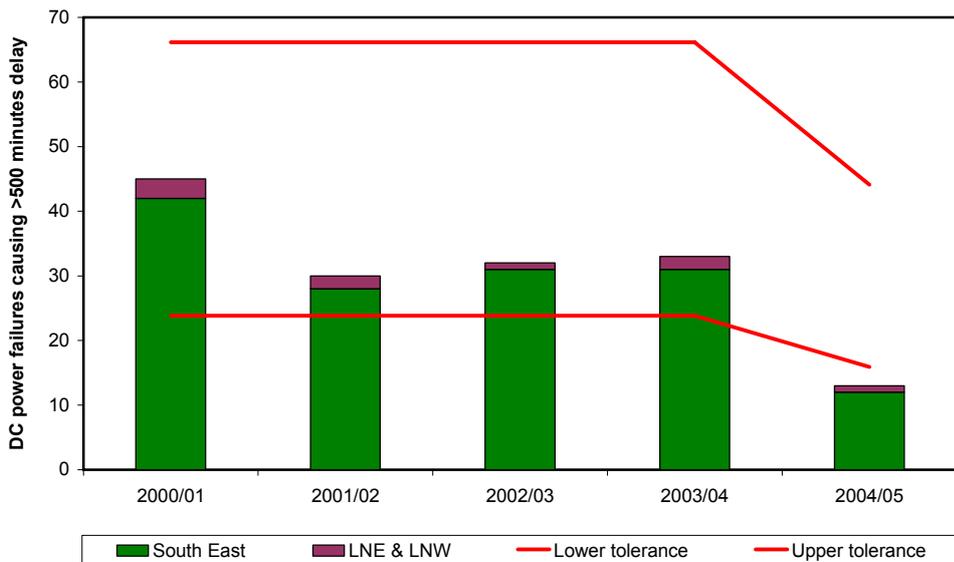


Figure 5.7.2 Number of DC power failures causing >500 minutes delay (M12)

Audit findings

Process

- 5.7.10 The data acquisition, verification and reporting mechanisms for this measure have not materially changed this year; but, as noted below, we found evidence in South East Territory of a more diligent approach to root-cause analysis and application of the reporting definitions.
- 5.7.11 On a daily basis, the National Engineering Reporting team collate OLE and conductor rail component incidents from the national incident log into a single spreadsheet.

- 5.7.12 Every four weeks, the spreadsheet is sent to the Territory E&P Engineers for verification that these incidents meet the definition for measure M11 or M12; a commentary is provided for each incident as appropriate. The Territories use a variety of data sources to verify the incidents including Production Logs, Compass, TRUST, FMS and contact with personnel involved in the incident and its remediation.
- 5.7.13 The spreadsheet is returned to the National Engineering Reporting team for reporting on a four-weekly basis. In parallel, for asset management purposes the Territory E&P teams provide a formal report to the HQ E&P team on the incident. At year-end Territory Engineers formally sign-off the data to be reported.

Accuracy of reported data

- 5.7.14 For each Territory, we investigated a sample of M11 incidents initially identified by the HQ Engineering Reporting team as being OLE component failure incidents causing over 500 minutes delay which was subsequently rejected by the Territory as falling outside the definition for this measure. We concurred with the reasons for rejection of the sampled OLE incidents.
- 5.7.15 For incidents caused by conductor rail component failures, we investigated every incident rejected, as the results for 2004/05 are 60.6% lower than for 2003/04.
- 5.7.16 In South East Territory, we found evidence of (a) improved management focus on finding the root cause of incidents attributed to traction power incidents and (b) more rigorous testing of each incident against the definition for the measure. This has directly led to the reduction in reported incidents this year. We have accepted the justification for all rejected conductor rail incidents except for two incidents (TRUST 499466 and 188578) where the rejection was not fully justified. Network Rail have accepted the 2004/05 reported figure should be increased by two to 15 failures, which still meets the target value of 15.9 including tolerance.
- 5.7.17 From this exercise, we note that incidents are initially attributed to overhead line or conductor rail failure when this is a symptom not a cause of the incident. However, when the correct root cause of an incident is identified as being with the train operator or with another asset class rather than an overhead line or conductor rail fault, the delay attribution in TRUST is not normally changed. This will adversely affect the reliability and accuracy of operational performance data reported in Section 1 of the Annual Return; it also significantly reduces the usefulness of the TRUST data for managers seeking to identify which assets most impact operational performance.
- 5.7.18 We note that this year there was a 523 minute delay caused by vandalism of the DC overhead line on the Sunderland extension of the Tyne & Wear Metro. This highlights the current definitions of M11 and M12, which are defined to cover AC overhead line and DC conductor rail incidents only; there is no measure for DC overhead line (though in this particular case the incident would not be reportable as incidents caused by vandalism are excluded by the definition).

Assessment of confidence grade

- 5.7.19 **Reliability grade.** The definitions for these measures are clearly documented. A single documented process has been followed to collect and report these measures. The process of correctly identifying the root cause of incidents attributed to overhead line or conductor rail components is not a simple process and the number of minutes attributed to a delay is known to be a subjective process. We believe that M11 and M12 should have a reliability grade of B.
- 5.7.20 **Accuracy grade (M11).** The process is not sufficiently robust to ensure that the number reported incidents is absolutely correct; due to the small total of AC power incidents reported, only a single incident incorrectly attributed would impact the results by more than 1%. We believe that M11 should have an accuracy grade of 2.

- 5.7.21 **Accuracy grade (M12).** The number of conductor rail component incidents reported for M12 is insufficiently large to support an assessment of the accuracy of this measure. We believe that M12 should have an accuracy grade of X.

Audit Statements

- 5.7.22 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for alternating current traction power incidents causing train delays (M11). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of B2. The regulatory target for this measure has been met.
- 5.7.23 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for direct current traction power incidents causing train delays (M12). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure, except for three incidents assessed by Network Rail as falling outside the definition of this measure, for which audit information is currently outstanding. The data has been assessed as having a confidence grade of BX. The regulatory target for this measure has been met.

Recommendations arising

- 5.7.24 **M11 recommendation 1.** We recommend that this measure is expanded to cover DC overhead line incidents.

5.8 Electrification condition – AC traction feeder stations & track sectioning points (M13)

Audit scope

- 5.8.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Electrification condition – AC traction feeder stations and track sectioning points (M13).
- 5.8.2 This is a condition measure for alternating current (AC) traction feeder stations (FSs) and track sectioning points (TSPs), using an assessment methodology called Electrification Condition Assessment Process (ECAP) to provide a condition grade from 1 to 5, where 1 is good condition and 5 is poor condition. ECAP for AC traction feeder stations and track sectioning points (M13-ECAP) is based on visual inspection, design, maintenance history, refurbishment history and performance of the 25kV switchgear.
- 5.8.3 The definition and procedure for this measure are documented in RT/ARM/M13DF (issue 3) and RT/ARM/M13PR (issue 5).
- 5.8.4 Audits were undertaken at Network Rail Headquarters and at London North Eastern, London North Western, Scotland and South East Territories. The London North Western Territory is responsible for reporting this measure for Western Territory.

Commentary on reported data

Regulatory & internal targets

- 5.8.5 The regulatory target for electrification condition set in ORR's Access Charges Review 2003 is to maintain the network at or below the baseline level recorded in 2001/02. In numerical terms, the regulatory target is an average condition score of not greater than 2.1; the statistical tolerance is ± 0.1 .
- 5.8.6 The extrapolated average condition score for year-end 2004/05 was 1.4, which has met the target.
- 5.8.7 The procedure for this measure has an internal target for the number of assets to be assessed; for 2004/05 this is 90% of the feeder station population and 90% of the track sectioning points. Figures 5.8.1 and 5.8.2 show that these targets have also been met.

Territory	Population (number)	90% target for 04/05 (number)	Achieved (number)	Achieved (percentage)
LNE	27	24	25	93%
LNW	26	23	24	92%
Scotland	10	9	9	90%
South East	20	18	19	95%
Total	83	74	77	93%

Figure 5.8.1 Progress for inspections – AC Feeder Stations

Territory	Population (number)	90% target for 04/05 (number)	Achieved (number)	Achieved (percentage)
LNE	51	46	45	88%
LNW	77	69	69	90%
Scotland	27	24	26	96%
South East	52	47	46	88%
Total	207	186	186	90%

Figure 5.8.2 Progress for inspections – AC Track Sectioning Points

Trend

5.8.8 Figure 5.8.3 shows the trend for average asset condition of AC traction feeder stations & track sectioning points (M13). There has been an improvement over the last four years; however, the condition of assets assessed in each year may not be representative of the underlying population, so this is not necessarily showing a year-on-year improvement in the condition of the asset base.

Period	00/01	00/01-01/02	00/01-02/03	00/01-03/04	00/01-04/05
Average Condition Score	2.1	2.1	1.9	1.9	1.9

Figure 5.8.3 Average condition of AC traction feeder stations & track sectioning points (M13)

5.8.9 Each year's results are based on the condition of a sample of the asset population. The average age of assets assessed in 2004/05 was 19.7 years in comparison with 25.9 years for the period 2000/1-2003/04. It is possible that the lower age profile may have contributed to the improvement in average condition grades. As Figure 5.8.4 shows, this improvement in average asset condition grade was driven by a higher proportion of the assets assessed in 2004/05 having a condition grade of 1 (ie good condition).

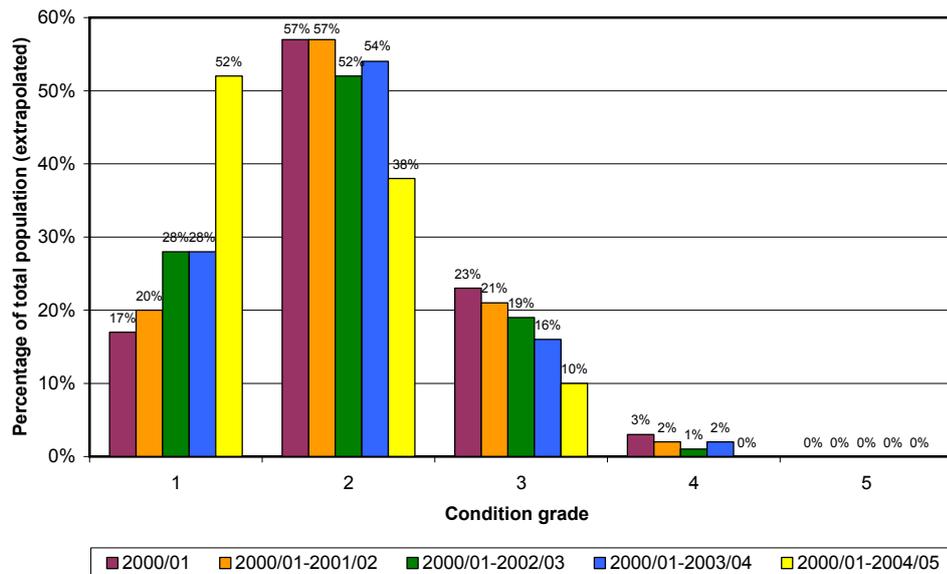


Figure 5.8.4 Average condition grade for AC assets (M13)

Audit findings

Process

5.8.10 The data acquisition, verification and reporting mechanisms for this measure have not materially changed this year.

5.8.11 The assets selected for assessment in 2004/05 were selected from a spreadsheet, controlled by the HQ Distribution Engineer, containing details of all feeder stations and track sectioning points on the network. M13-ECAP questionnaires were completed on site by Territory E&P Engineers (Distribution) or Territory Assurance Engineers.

- 5.8.12 The M13-ECAP scores were sent to the HQ Distribution Engineer, who inputted the scores to the spreadsheet which extrapolates the average results for the assessed population across the entire population. The HQ Engineer reported the results using a formal sign-off process.
- 5.8.13 No formal training in use of the M13-ECAP questionnaires was conducted for the personnel undertaking this subjective condition assessment process this year. A guidance note for the questionnaire is provided. We are assured by Network Rail that informal on-site training was provided for new personnel by those experienced in the M13-ECAP process; this was not independently verified.
- 5.8.14 The Territory personnel do not undertake formal quality assurance processes but we found evidence of ad hoc checking of assessments and mentoring of the assessors. An HQ audit was conducted this year for South East and London North Western Territories but there was no audit report available to evidence this.
- 5.8.15 The results of this measure are not used in Network Rail's asset management system except on London North Western Territory where it forms a minor part of a 'health index' for K11 Switchgear³. This is because (a) the results from the M13-ECAP questionnaire are not readily useable by asset managers for decision-making and (b) the assessment is conducted on a 'per location' basis – a 'per asset' assessment would align more closely with asset management activities. Territory personnel preferred quantitative measurement technologies (such as discharge tests and oil sampling), asset age and asset model (eg manufacturer, design) as indicators for renewal condition assessment.
- 5.8.16 The collection of this measure does not align with Network Rail's inspection of the asset; maintenance personnel undertake a four-yearly inspection whilst this measure requires a five-yearly assessment. It may be sensible for the M13-ECAP questionnaire to be completed at the four-yearly inspection as (a) useful condition information will be generated at the inspection which could be included in the M13-ECAP questionnaire and (b) this is more efficient. As a side-effect, this would also marginally increase the rate of assessment for this measure from five- to four-yearly.

Accuracy of reported data

- 5.8.17 We inspected a sample of M13-ECAP questionnaires which we found were completed in accordance with the guidance note; the scores on the questionnaires aligned with those reported by HQ personnel and in the Annual Return.

Assessment of confidence grade

- 5.8.18 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subjective and the results are subject to extrapolation. We believe that M13 should have a reliability grade of B.
- 5.8.19 **Accuracy grade.** The process of condition assessment is subjective and the results are extrapolated across 9.3% of the assets which have not yet been assessed. Our samples show that the process as described was accurately followed this year. We believe that M13 should have an accuracy grade of 2.

³ NB We would note that the K11 Switchgear health index developed by LNW appeared to a useful development which would warrant review by HQ for distribution as best practice.

Audit Statement

- 5.8.20 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for Electrification condition of AC traction feeder stations and track sectioning points (M13). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of B2. The regulatory target for this measure has been met.

Recommendations arising

- 5.8.21 **M13 recommendation 1.** We recommend that the M13-ECAP questionnaire should be reviewed in 2005/06; this would enable a new questionnaire to be used in 2006/07 once the population has been assessed using the current questionnaire. This review should incorporate appropriate Territory and Area personnel and the specific recommendations made by Reporter A in previous years.
- 5.8.22 **M13 recommendation 2.** We recommend the condition assessments for this measure are undertaken at the four-yearly inspection not at specific five-yearly site visits.
- 5.8.23 **M13 recommendation 3.** Similar to previous years, we recommend that one or more measures for reporting on the condition of plant are developed by Network Rail and incorporated in the Annual Return.
- 5.8.24 **M13 recommendation 4.** We recommend that Network Rail should develop and roll-out a training course and associated competence management system for the M13-ECAP process. This should include a process for mentoring and checking assessments.

5.9 Electrification condition – DC substations (M14)

Audit scope

- 5.9.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Electrification condition – DC substations (M14).
- 5.9.2 This is a condition measure for direct current (DC) substations, using an assessment methodology called Electrification Condition Assessment Process (ECAP) to provide a condition grade from 1 to 5, where 1 is good condition and 5 is poor condition. ECAP for DC substations (M14-ECAP) is based on visual inspection and the robustness of design, maintenance history, refurbishment history and performance of the high voltage switchgear, rectifier transformers, rectifiers and DC switchgear.
- 5.9.3 The definition and procedure for this measure are documented in RT/ARM/M14DF (issue 3) and RT/ARM/M14PR (issue 5).
- 5.9.4 Audits were undertaken at Network Rail Headquarters and at London North Eastern, London North Western and South East Territories. Western and Scotland Territories are not responsible for DC traction power assets.

Commentary on reported data

Regulatory & internal targets

- 5.9.5 The regulatory target for electrification condition set in ORR's Access Charges Review 2003 is to maintain the network at or below the baseline level recorded in 2001/02. In numerical terms, the regulatory target is an average condition score of not greater than 2.3; the statistical tolerance is ± 0.1 .
- 5.9.6 The extrapolated average condition score for year-end 2004/05 was 1.8, which has met the target.
- 5.9.7 The procedure for this measure has an internal target for the number of assets to be assessed. For 2004/05 this is 90% of the DC substation population. Figure 5.9.1 shows the target has not been met; LNE and South East are responsible for the shortfall.

Territory	Population (number)	90% target for 04/05 (number)	Achieved (number)	Achieved (percentage)
LNE	6	6	3	50.0%
LNW	44	40	40	90.9%
South East	367	331	328	89.4%
Total	417	377	371	89.0%

Figure 5.9.1 Progress for inspections – DC sub-stations (M14)

Trend

- 5.9.8 Figure 5.9.2 shows the trend for average asset condition of DC substations (M14). There has been an improvement over the last three years; however, the condition of assets assessed in each year may not be representative of the underlying population, so this is not necessarily showing a year-on-year improvement in the condition of the asset base.

Period	00/01	00/01-01/02	00/01-02/03	00/01-03/04	00/01-04/05
Average Condition Score	2.2	2.3	2.1	1.9	1.8

Figure 5.9.2 Average condition of DC sub-stations (M14)

5.9.9 As Figure 5.9.3 shows, this improvement in average asset condition is driven by a high proportion of the assets assessed in 2004/05 having a condition grade of 1 (ie good condition) in comparison with previous years. We are unable to test if the age of assets assessed this year this might be a cause of this increase in grade 1 assets as each site has equipment of different ages.

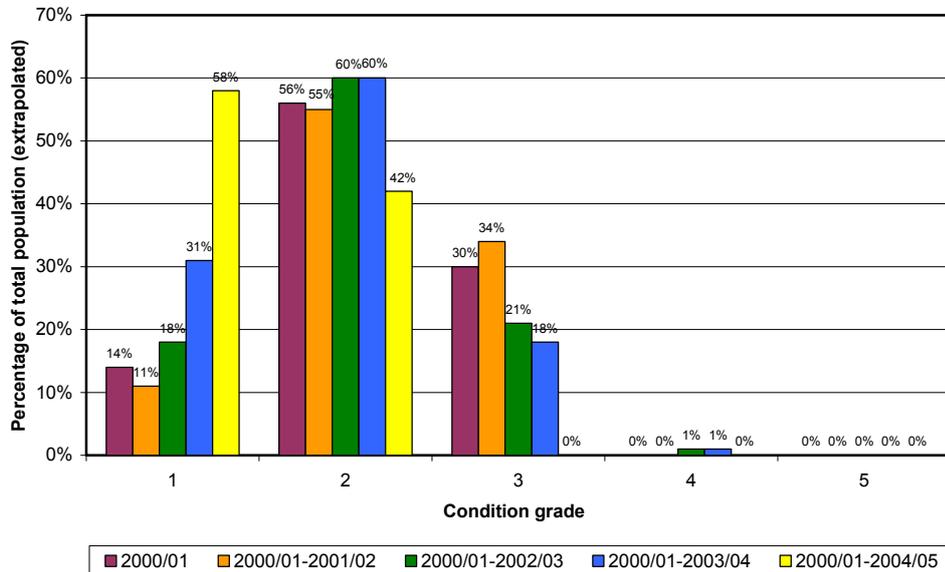


Figure 5.9.3 Average condition grades for DC sub-stations (M14)

Audit findings

Process

- 5.9.10 The data acquisition, verification and reporting mechanisms for this measure have not materially changed this year.
- 5.9.11 This process is similar to the process for M13, except that the ECAP questionnaire is for DC traction substations. The process is also run by the HQ Distribution Engineer.
- 5.9.12 The HQ Distribution Engineer selected the assets to be assessed in 2004/05 from a spreadsheet containing details of all feeder stations and track sectioning points on the network. M14-ECAP questionnaires were completed on site by Territory E&P Engineers (Distribution) or Territory Assurance Engineers. The M14-ECAP scores were sent to the HQ Distribution Engineer, who input the scores to the spreadsheet which extrapolates the average results for the assessed population across the entire population. The HQ Engineer reported the results using a formal sign-off process.
- 5.9.13 Similar to M13, no formal training in use of the M14-ECAP questionnaires was conducted for the personnel undertaking this subjective condition assessment process this year. We are assured by Network Rail that informal on-site training was provided for new personnel by those experienced in the M13-ECAP process; this was not independently verified.
- 5.9.14 Similar to M13, the Territory personnel do not undertake formal quality assurance processes but we found evidence of ad hoc checking of assessments and mentoring of the assessors. An HQ audit was conducted this year for South East and London North Western Territories but there was no audit report available to evidence this.

- 5.9.15 Similar to M13, the results of this measure are not used in Network Rail's asset management system. Again, Territory personnel preferred to use quantitative measurement technologies (such as discharge tests and oil sampling), asset age and asset model (eg manufacturer, design) as indicators for renewal condition assessment and to assess condition on a 'per asset' basis rather than a 'per location' basis – in our experience, entire substations are not renewed as a single project.

Accuracy of reported data

- 5.9.16 We inspected a sample of M14-ECAP questionnaires which we found were completed in accordance with the guidance note; the scores on the questionnaires aligned with those reported by HQ personnel and in the Annual Return.
- 5.9.17 Territory personnel questioned why the condition score is always rounded down by the HQ reporting process. An assessing engineer in the Territory would not expect an asset assessed by M14-ECAP as 2.99 to be scored as a condition grade of 2 but for it to be naturally rounded to 3. We would suggest that the entire dataset should be recalculated using natural rounding once all of the population has been assessed.

Assessment of confidence grade

- 5.9.18 **M14 Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subjective and the results are subject to extrapolation. We believe that M14 should have a reliability grade of B.
- 5.9.19 **M14 Accuracy grade.** The process of condition assessment is subjective and the results are extrapolated across 11.0% of the assets which have not yet been assessed. Our samples show that the process as described was accurately followed this year. We believe that M14 should have an accuracy grade of 2.

Audit Statements

- 5.9.20 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for electrification condition of DC substations (M14). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of B2. The regulatory target for this measure has been met.

Recommendations arising

- 5.9.21 **M14 recommendation 1.** We recommend that the M14-ECAP questionnaire should be reviewed in 2005/06; this would enable a new questionnaire to be used in 2006/07 once the population has been assessed using the current questionnaire. This review should incorporate appropriate Territory and Area personnel and the specific recommendations made by Reporter A in previous years, including inclusion of track paralleling huts and HV cables in the assessment process.
- 5.9.22 **M14 recommendation 2.** We recommend that the dataset of condition scores should be recalculated using natural rounding once all of the population has been assessed.
- 5.9.23 **M14 recommendation 3.** We recommend that Network Rail should develop and roll-out a training course and associated competence management system for the M14-ECAP process. This should include a process for mentoring and checking assessments.

5.10 Electrification condition – AC traction contact systems (M15)

Audit scope

- 5.10.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Electrification condition – AC traction contact systems (M15).
- 5.10.2 This is a condition measure for AC traction contact systems, using an assessment methodology called Electrification Condition Assessment Process (ECAP) to provide a condition grade from 1 to 5, where 1 is good condition and 5 is poor condition. ECAP for AC contact systems is based on visual inspection of a tension length (TL), such as contact wires, catenary wires, registration assemblies and structures; the measure excludes earthing, bonding and traction return circuits.
- 5.10.3 The definition and procedure for this measure is documented in RT/ARM/M15DF (issue 3) and RT/ARM/M15PR (issue 4).
- 5.10.4 Audits were undertaken at Network Rail Headquarters and at London North Eastern, London North Western, Scotland and South East Territories. The London North Western Territory is responsible for reporting this measure for Western Territory.

Commentary on reported data

Regulatory & internal targets

- 5.10.5 The regulatory target for electrification condition set in ORR's Access Charges Review 2003 is to maintain the network at or below the baseline level recorded in 2001/02. In numerical terms, the regulatory target is an average condition score of not greater than 1.8; the statistical tolerance is ± 0.1 .
- 5.10.6 The extrapolated average condition score for year-end 2004/05 was 1.7, which has met the target as it is equal to the lower tolerance level for the target.

Internal target

- 5.10.7 The procedure for this measure has an internal target for the number of assets to be assessed. For 2004/05 this is 18% of AC contact system. Figure 5.10.1 shows 16.9% of the population has been assessed. This target has not been met this year. LNE is responsible for a shortfall of 130 tension lengths against its target for this year (a 34.1% shortfall) compared with a total network shortfall of only 84 tension lengths (a 6.3% shortfall).

Territory	Population (standardised track km: STK)	18% target for 2004/05 (STK)	Achieved (tension length: TL)	Percentage achieved (1 TL \approx 1 STK)
LNE	2,125	382.5	252.0	11.9%
LNW	2,640	475.2	523.0	19.8%
Scotland	1,167	210.1	216.0	18.5%
South East	1,415	254.7	255.0	18.0%
Western	110	19.8	12.0	10.9%
Total	7,457	1,342.3	1258.0	16.9%

Figure 5.10.1 Progress for inspections – AC contact systems (M15)

- 5.10.8 In 2004/05, a total of 118 tension lengths have been assessed, which increased the total M15 sample by 1.6% from 15.2% of the population last year to 16.9% this year. This is further discussed in the audit findings section below.

5.10.9 The target for next year is 20% of the population.

Trend

5.10.10 Figure 5.10.2 shows the trend for average asset condition of AC contact systems (M14). There has been a steady improvement over the last five years. In 2004/05, there has been no change in the average condition score.

Period	00/01	00/01-01/02	00/01-02/03	00/01-03/04	00/01-04/05
Average Condition Score	1.9	1.8	1.8	1.7	1.7

Figure 5.10.2 Average condition of DC sub-stations (M14)

5.10.11 Figure 5.10.3 shows the largely static trend for the last four years.

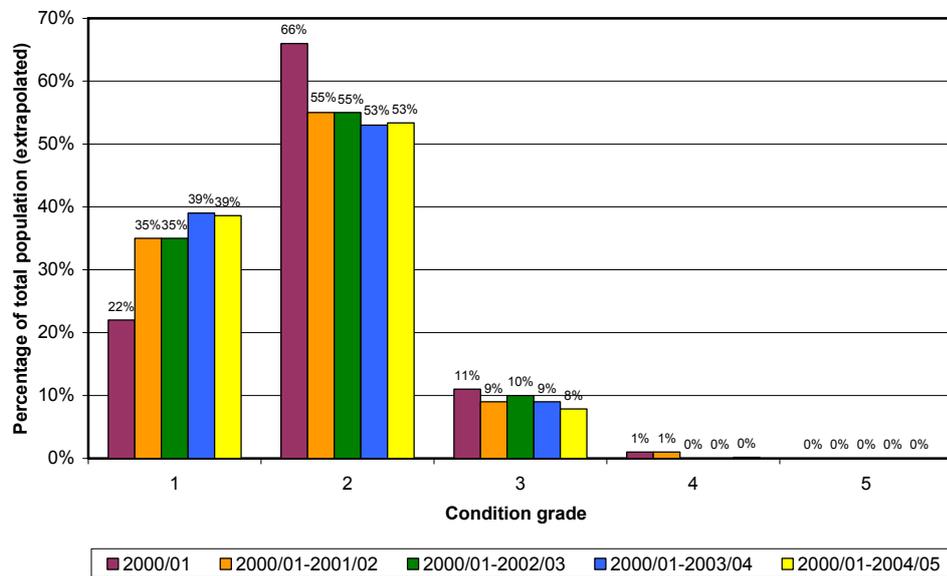


Figure 5.10.3 Average condition of AC contact systems (M14)

Audit findings

Impact of reorganisation

5.10.12 The definition and procedure have not been changed this year. However, during the 04/05 year, Network Rail has reorganised: (a) moving from a geographical organisational structure to a functional structure and (b) in-sourcing maintenance activity which was formerly contracted to Infrastructure Maintenance Companies (IMCs).

5.10.13 This change in structure has led to a refocusing of resources. No resources have been allocated to undertake M15 inspections at Territory level in the 2004/05 year after the reorganisation. This under-resourcing has directly led to the shortfall against target this year. Figure 5.10.4 shows the 118 inspections undertaken this year by Regional staff prior to the reorganisation.

- 5.10.14 The M15 inspections must now be newly specified by the HQ Principal Engineer (Contact Systems) through a process of setting standards, procedures, work instructions and MIMS work management plans in agreement with the Maintenance Directorate so that Area maintenance personnel can be allocated to undertake the inspections. We expect that these changes will provide a robust method for managing these inspections once the process of change is complete.

Territory	Tension length inspections by 2003/04 year end	Tension length inspections in 2004/05
LNE	250.0	2.0
LNW	419.0	116.0
Scotland	216.0	0.0
South East	255.0	0.0
Total	1140.0	118.0

Figure 5.10.4 Number of inspection undertaken in 2004/05

- 5.10.15 Inspections in LNW were undertaken by Assurance Engineers from the former Midland Region (51) and former North West Region (65) and Great Western Region (6) using the M15-ECAP questionnaire. This utilised contact wire wear measurements, maintenance reports, structures examination and MENTOR/ OLIVE reports where available.
- 5.10.16 The completed questionnaires and scores were reported to the HQ Principal Engineer (Contact Systems). The HQ Business Planning Manager (E&P) was responsible for using this data in a spreadsheet to extrapolate the condition grades for reporting.

Accuracy of reported data

- 5.10.17 We inspected a small sample of M15-ECAP questionnaires which we found were completed in accordance with the guidance note; the scores on the questionnaires aligned with those reported by HQ personnel and in the Annual Return.
- 5.10.18 Our audit of the HQ spreadsheet for calculating the condition grades was hampered by the poor layout and labelling of columns. We did however, replicate the calculations made. There are currently ten sample routes out of 119 sample routes which have not been inspected at all and therefore are excluded from the extrapolation calculation.

Assessment of confidence grade

- 5.10.19 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subjective and the results are subject to extrapolation. We believe that M15 should have a reliability grade of B.
- 5.10.20 **Accuracy grade.** The process of condition assessment is subjective and the results are extrapolated across 83.1% of the asset population which has not yet been assessed. Our small number of samples show that the process as described was accurately followed this year. We believe that M15 should have an accuracy grade of 3.

Audit Statements

- 5.10.21 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for electrification condition of AC traction contact systems (M15). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of B3. The regulatory target for this measure has been met.

Recommendations arising

- 5.10.22 **M15 recommendation 1.** We recommend that the change process for allocating maintenance resources to undertaken the M15 inspection process is completed as a matter of urgency.
- 5.10.23 **M15 recommendation 2.** We recommend that the spreadsheet used to calculate this measure is (a) formatted in line with standard practice to improve clarity, (b) tidied so that regulatory calculations are in a logical order and (c) other unrelated calculations are deleted or moved to another spreadsheet.

5.11 Electrification condition – DC traction contact systems (M16)

Audit scope

- 5.11.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Electrification condition – DC traction contact systems (M16).
- 5.11.2 This is a condition measure for conductor rail contact systems, based on (a) wear measurements of conductor rails and (b) extrapolation using a series of assumptions, to provide a condition grade from 1 to 5, where 1 is good condition and 5 is replacement required. The measure excludes all equipment other than the conductor rail itself.
- 5.11.3 The definition and procedure for this measure are documented in RT/ARM/M16DF (issue 3) and RT/ARM/M16PR (issue 4).
- 5.11.4 Audits were undertaken at Network Rail Headquarters and at South East Territory. No data was reported by London North Eastern and London North Western Territories this year. Scotland and Western Territories do not have conductor rail traction systems.

Commentary on reported data

Regulatory & internal targets

- 5.11.5 The regulatory target for electrification condition set in ORR's Access Charges Review 2003 is to maintain the network at or below the baseline level recorded in 2001/02. In numerical terms, the regulatory target is an average condition score of not greater than 1.8; the statistical tolerance is ± 0.1 .
- 5.11.6 The average condition score for all assets assessed by year-end 2004/05 was 1.9 which has nominally failed to meet the regulatory target but has met the upper statistical tolerance for the target.
- 5.11.7 The procedure for this measure has an internal target to ensure that wear measurements are undertaken "with a periodicity of up to ten years". Figure 5.11.1 shows the age profile of the gauge measurements for South East; 14.9% of the measurements are greater than ten-years old.

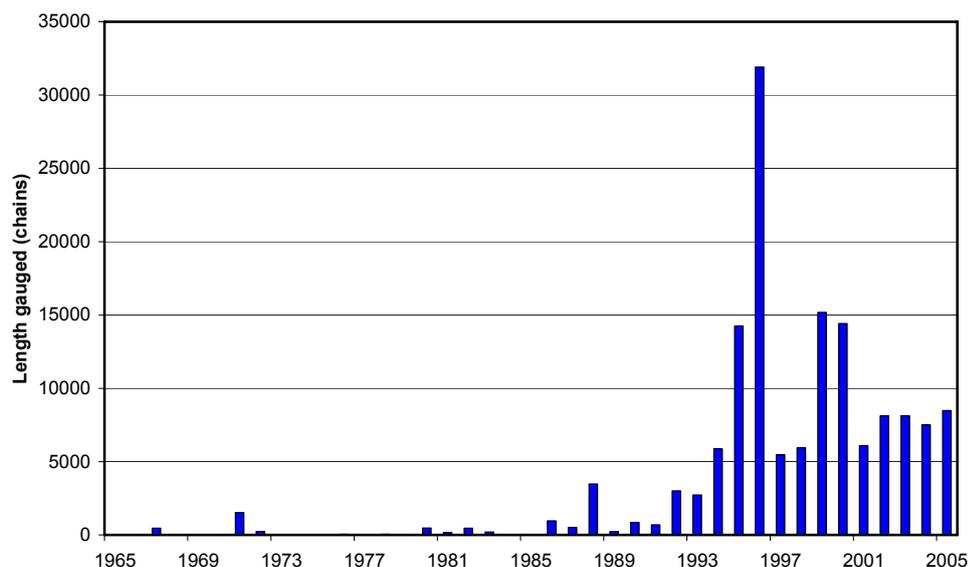


Figure 5.11.1 Age profile for wear measurements on South East Territory (M16)

Trend

5.11.8 Figure 5.11.2 shows the trend for average asset condition of conductor rails (M16). The results reported for measure M16 have previously remained constant since 2000/01 at 1.8. In 2004/05, there has been no change in the average condition score.

Period	00/01	00/01-01/02	00/01-02/03	00/01-03/04	00/01-04/05
Average Condition Score	1.8	1.8	1.8	1.8	1.9

Figure 5.11.2 Average condition of conductor rails (M16)

5.11.9 The results reported for measure M16 have remained constant since 2000/01 at 1.8. This stability is not surprising as only 26% of conductor rail wear measurements⁴ included within the measure have been undertaken since 2000. A large proportion of the information reported for this measure is based upon old wear measurements, extrapolated to reflect an estimate of current wear.

5.11.10 Figure 5.11.3 shows the largely static trend for the last four years.

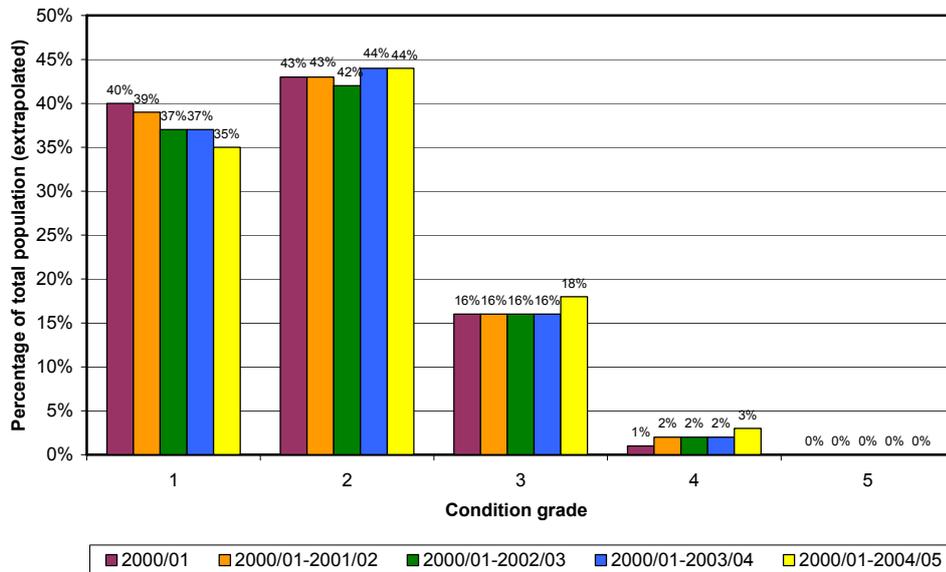


Figure 5.11.3 Average condition of conductor rails (M16)

Audit findings

Process

5.11.11 Wear measurement is undertaken by manual gauging in accordance with the work instruction RT/E/WI/27222 or by an approved conductor rail measurement system. Measurements are entered into a standardised spreadsheet for storage by Territory personnel.

5.11.12 The standardised spreadsheet contains:

- (a) Details of wear measurements undertaken in the current and previous years;

⁴ This figure is for South East Territory which contains the vast majority of the asset population.

- (b) Lookup tables with standard wear rates, so that the current level of wear can be estimated from wear measurements corresponding to previous years;
 - (c) Lookup tables with age estimates for particular levels of wear, so that the age of data can be back-calculated from the level of wear recorded; this is used when the date of a historic wear measurement has been lost;
 - (d) Algorithms for calculating the condition grades from the wear measurements.
- 5.11.13 A reporting spreadsheet is administered by the HQ Business Planning Manager (E&P) for the Principal Engineer (Contact Systems). The reported data was subject to sign-off by the Territory E&P Engineers.
- 5.11.14 No HQ or Territory audits were conducted this year.

Accuracy of reported data

- 5.11.15 LNW reported to us that no data was to be presented this year.
- 5.11.16 For 2004/05, no data has been reported for Kent route and Sussex has reported only 62.5 chains; Wessex, however, has delivered 105.2 miles of wear measurements.
- 5.11.17 The data provided by South East Territory matched that in the HQ spreadsheet and correlated with the data presented in the Annual Return. With some difficulty, we inspected the spreadsheets used to store and calculate the condition grades; we verified the calculations.

Developments

- 5.11.18 Similar to previous years, we have been assured by both HQ and Territory personnel that Network Rail is developing a train-borne conductor rail gauging system which will be able to measure the position and cross-sectional profile of contact rails for wear calculations. We understand from Network Rail's Engineering Support Centre that this is unlikely to be ready for the 2005/06 reporting year.
- 5.11.19 Similar to M15, the M16 inspections must be further codified by the HQ Principal Engineer (Contact Systems) so that Area maintenance personnel can be allocated to undertake the inspections. We expect that these changes will provide a robust method for managing these inspections once the process of change is complete.

Assessment of confidence grade

- 5.11.20 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. The process of condition assessment is subject to extrapolation. We believe that M16 should have a reliability grade of B.
- 5.11.21 **Accuracy grade.** The calculation of wear is largely extrapolated using historic wear rates for different rail types and estimated levels of wear for when the dates of wear measurements have been lost. The condition grade is directly based on this extrapolated data. We believe that M16 should have an accuracy grade of 3.

Audit Statements

- 5.11.22 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for electrification condition of DC traction contact systems (M16). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure. The data has been assessed as having a confidence grade of B3. The upper statistical tolerance for the regulatory target has been met.

Recommendations arising

- 5.11.23 **M16 recommendation 1.** We recommend that the spreadsheets used to calculate this measure are (a) consistently formatted in line with standard practice to improve clarity and (b) tidied so that regulatory calculations are in a logical order.

5.12 Track Renewal Volumes (M20, M21, M22, M25)

Audit scope

- 5.12.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Track Renewal Volumes which comprises the renewals volumes for rails (M20), sleepers (M21), ballast (M22) and switches & crossings (M25)
- 5.12.2 The definitions and procedure for these measures are documented in:
- RT/ARM/M20DF (issue 5);
 - RT/ARM/M21DF (issue 5);
 - RT/ARM/M22DF (issue 5);
 - RT/ARM/M25DF (issue 2);
 - RT/ARM/M20PR (issue 4).
- 5.12.3 These measures have a common procedure and data collection process; we have therefore audited and reported on these measures together. Audits were undertaken at Network Rail Headquarters, the West Coast Route Modernisation (WCRM) team and the Major Project & Investment (MP&I) track renewals team.

Commentary on reported data

Regulatory targets

- 5.12.4 There are no regulatory targets for these measures.

Trend

- 5.12.5 Figure 5.12.1 shows a steady rising trend for non-WCRM track renewal (rail, sleepers and ballast) from 2000/02-2003/04 which has been stabilised or reversed in 2004/05; rail renewals have decreased by 24.7% this year. This analysis is based on the 2003/04 rail renewed data from the 2004 Annual Return; Network Rail has advised that the value reported in the 2005 Annual Return for 2003/04 rail renewed is incorrect.

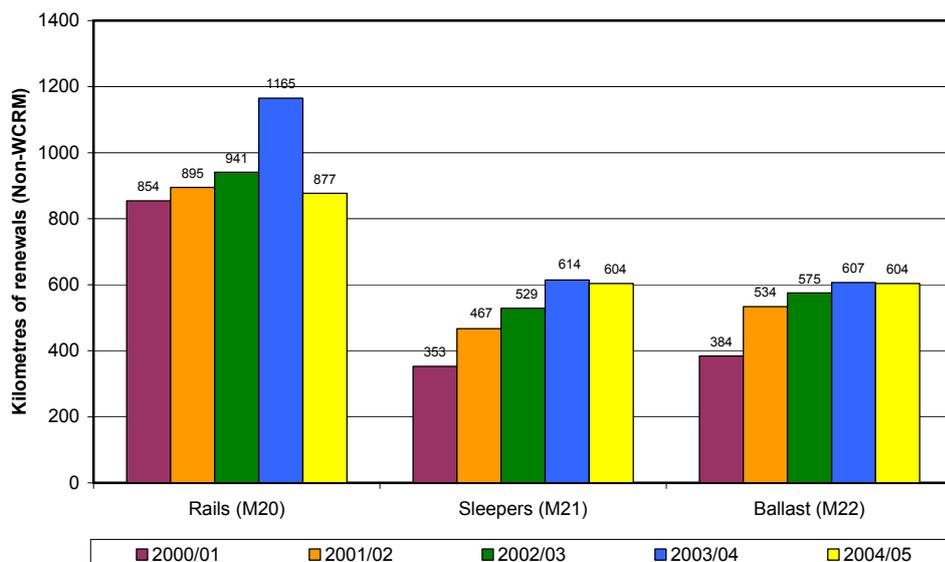


Figure 5.12.1 Track renewal volumes excl. WCRM (M0, M21, M22)

- 5.12.6 Figure 5.12.2 shows non-WCRM S&C renewals have risen by 216% over the last four years and by 48% this year. This is due to a change in Network Rail's asset management practices for S&C over this period.

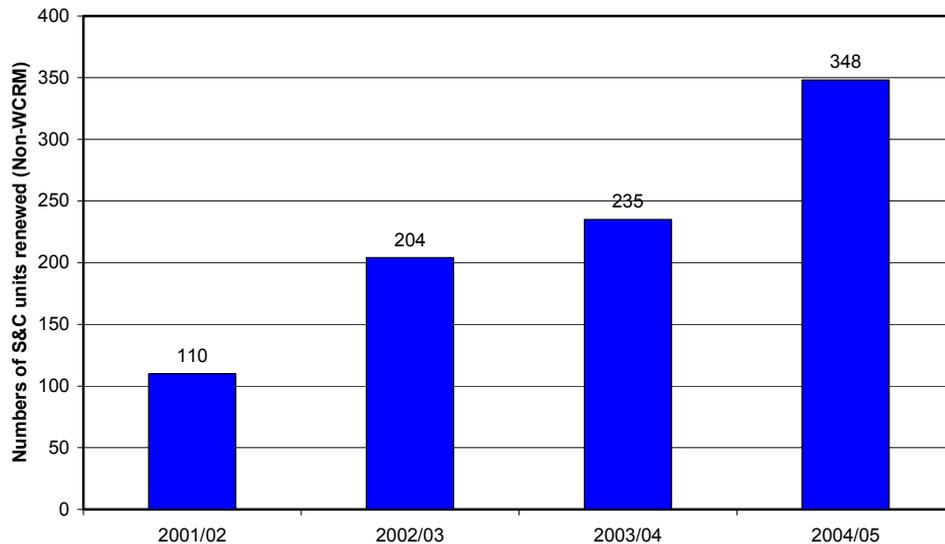


Figure 5.12.2 Switch and crossing renewal excl. WCRM (M25)

Audit findings

West Coast Route Modernisation

- 5.12.7 **Process.** Each week, renewals volumes are entered into the WCRM Programme Control System (PCS) by project teams using 450 WCRM Activity Codes which align with the WCRM cost control system; these actuals are verified by West Coast Engineering, Project Controls Managers and the Project Manager.
- 5.12.8 For the track renewals measures, the WCRM Performance Measurement Manager used bespoke queries to collate the appropriate data from PCS; this data was sent to the HQ Champion for these measures.
- 5.12.9 We inspected the PCS query output for M20, M21, M22 and M25 and used it to verify the nationally reported figures.
- 5.12.10 **M20 Rail.** The definition requires reportable rail renewal works to be of 200 yards or more. WCRM record all rail renewals in PCS which may have led to some minor over-reporting.
- 5.12.11 **M21 Sleepers.** For the majority of the reporting year, the material of sleepers laid was not recorded, as PCS was not configured to record this information; it has now been configured to do so. Consequently, wood and steel sleepers will have been under-reported as a proportion of the total reported sleeper volumes for the 2004/05 reporting year. WCRM does not record patch re-sleepering as required by the definition and procedure; however, WCRM are unlikely to have delivered any patch re-sleepering.
- 5.12.12 **M22 Ballast.** The type of re-ballasting was not recorded for the majority of the reporting year as PCS was not configured to record the type of re-ballasting; it has now been configured to do so. These renewals have been reported as concrete sleepers.
- 5.12.13 **M25 S&C.** PCS records WCRM S&C renewals as either "Renew", "Install" or "Heavy Maintenance". "Renew" have been reported as full renewals; "Heavy Maintenance" have been reported as partial renewals. This is not fully accurate but appears to be a sensible estimation of the levels of full and partial S&C renewal by WCRM.

MP&I track renewals

- 5.12.14 Data is collected and collated by the ten renewals delivery teams ('Integrated Management Teams' or IMT) as part of normal project controls and forwarded to the central Track Renewals team in York on a four-weekly basis. Data is collected on Core Data Sheets (CDS) that list all the individual jobs and give specification details. This is a process which is closely managed and used for internal reporting and control purpose.
- 5.12.15 These CDS were used by the Senior Contract & Procurement Manager in MP&I Track to report renewals data to the HQ Champion for these measures. Additional information regarding the type of sleeper used (which is not reported internally) was supplied to the Senior Contract & Procurement Manager in MP&I Track by Project Cost & Commercial Managers in each IMT.
- 5.12.16 We inspected a sample of CDS and used the data sent by the Project Cost & Commercial Managers to verify the nationally reported figures.

Maintenance teams

- 5.12.17 The HQ Champion for the track renewals measures identified the MIMS maintenance work planning codes which aligned with each track renewals measure. These MIMS codes were used to identify the volume of renewals works undertaken by Area maintenance teams. Area maintenance teams undertake works for the ten Integrated Management Teams responsible for track renewals, where it is more cost or resource efficient for the renewal works to be undertaken by the maintenance team.
- 5.12.18 We assessed each of the MIMS codes and verified that they appeared to meet the definition for each measure as appropriate; we used the output from MIMS to verify the nationally reported figures.

HQ Reporting

- 5.12.19 The HQ Champion for these measures sense checked the data received, confirming it with the recipient before reporting it. No formal audit or sign-off process was used.

Assessment of confidence grade

- 5.12.20 **Reliability grade.** The definition for this measure is clearly documented. A single documented process has been followed to collect and report this measure. There are known minor issues with the definitions used in the WCRM Programme Control System which has required some estimation of data. We believe that the track renewals measures (M20, M21, M22, M25) should have a reliability grade of B.
- 5.12.21 **Accuracy grade.** There are known minor issues with the data due the definitions used in the WCRM Programme Control System and possible inaccuracies from the MIMS codes used for maintenance volumes; however, the majority of data has been reported with a high degree of accuracy by the MP&I track renewals team. We believe that the track renewals measures (M20, M21, M22, M25) should have an accuracy grade of 2.

Audit Statements

- 5.12.22 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for track renewals measures the track renewals measures (M20, M21, M22, M25). We can confirm the data has been collected and reported in accordance with the relevant definition and procedure, except with minor shortcomings which are noted in the audit report. The data has been assessed as having a confidence grade of B2. There are no regulatory targets for these measures.

Recommendations arising

- 5.12.23 **M25 recommendation 1.** The WCRM PCS definitions for "Renew" and "Heavy Maintenance" should be aligned with the regulatory definitions for full S&C renewal and partial S&C renewal if possible.

5.13 Signalling Renewal Volumes (M24)

Audit scope

- 5.13.1 These audits were undertaken to assess the reliability and accuracy of data and commentary reported in Network Rail's Annual Return 2004/05, Section 3, Signalling renewed (M24).
- 5.13.2 Signalling renewals are measured in signalling equivalent units, which are defined as a single trackside output function controlled by an interlocking, such as a signal, shunter's plunger, ground frame, controlled point end or level crossing. It includes the whole vertically-integrated configuration of signalling equipment from the signaller's control panel to the trackside signal or point.
- 5.13.3 The definitions and procedure for these measures are documented in RT/ARM/M24DF (issue 4) and RT/ARM/M24PR (issue 1).
- 5.13.4 Audits were undertaken at Network Rail Headquarters and the West Coast Route Modernisation (WCRM) team. We are awaiting information which may require further audits are conducted.

Commentary on reported data

Regulatory targets

- 5.13.5 There are no regulatory targets for this measure.

Trend

- 5.13.6 Figure 5.13.1 shows WCRM is delivering 56% of the signalling equivalent units renewed in 2004/05, driving a 45.3% increase in SEUs renewed in comparison with last year.

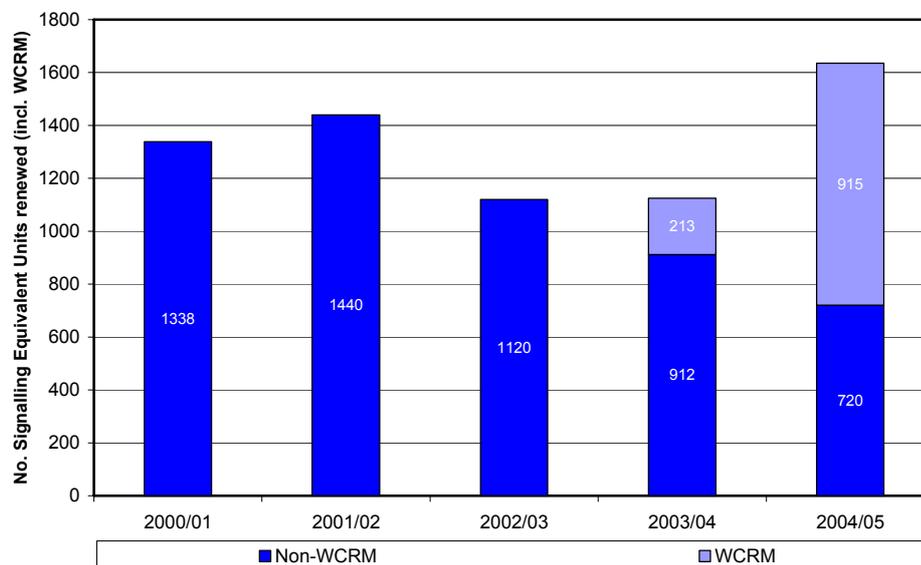


Figure 5.13.1 Signalling Equivalent Units renewed incl. WCRM (M24)

- 5.13.7 The number of renewed SEUs on the non-WCRM network is dropping while Network Rail develops its long-term renewals strategy for signalling; this is likely to be further developed as part of the forthcoming Signalling Interim Review.

Audit findings

West Coast Route Modernisation

- 5.13.8 Each week, renewals volumes are entered into the WCRM Programme Control System (PCS) by project teams using 450 WRCM Activity Codes which align with the WCRM cost control system; these actuals are verified by West Coast Engineering, Project Controls Managers and the Project Manager. However, PCS tracks the units of installed assets delivered not the number of SEUs.
- 5.13.9 The number of SEUs delivered by WCRM is based on the remitted scope of the schemes; this may not accurately represent the number of SEUs for the commissioned scheme. We have not been able to assess the extent of this possible discrepancy.

MP&I Signalling or Territory Signalling Renewals Managers

- 5.13.10 The process requires MP&I Signalling teams assemble SEU counts for commissioned signalling schemes and sending them to the HQ Critical Resources Manager who is responsible for collating the SEU count and reporting to the HQ Champion for this measure. This process was not used this year. Instead the Project Controls team of the MP&I Signalling team developed an assessment of SEUs commissioned from 01 April 2004 to 31 December 2004. There is currently no data available or reported for the period 31 December 2004 to 31 March 2005.

Assessment of confidence grade

- 5.13.11 **Reliability grade.** The definition and procedure for this measure is clearly documented. However, the procedure this year has not been followed and an ad hoc and uncompleted process used in its place. We believe M24 should have a reliability grade of C.
- 5.13.12 **Accuracy grade.** The calculation of SEUs counts is open to interpretation and partial SEUs can easily be excluded from large schemes. Small renewal works delivering partial SEUs can also be missed. There is significant doubt regarding the accuracy of the data provided by WCRM and MP&I Signalling team. We believe M24 should have an accuracy grade of 4.

Audit Statements

- 5.13.13 We have audited the reliability and accuracy of data and commentary presented in Network Rail's Annual Return 2004/05 for signalling renewed (M24). The data has been assessed as having a confidence grade of C4. There is no regulatory target for this measure.

Recommendations arising

- 5.13.14 There are no recommendations arising from our audit findings.

5.14 KPI 6 – Asset Stewardship Incentive Index (ASII)

Audit scope

- 5.14.1 The scope of this audit was to verify the reliability and accuracy of data reported in Network Rail’s Annual Return 2004/05, Section 3, KPI 6 Network Rail Asset Stewardship Index (ASII).
- 5.14.2 This measure is now presented as an individual measure in the Annual Return for 2004/5 (it was previously included as part of overall KPI reporting in 2003/04). It is an aggregate index comprising normalised measures of condition and performance of track, signalling, electrification, structures and earthworks. The index is compiled nationally and is a calculated measure, based on results reported for the constituent measures (with normalisation against a baseline reported figure). Our audit was thus focussed on ensuring consistency of data used in calculation with that for reporting of constituent measures (accuracy of underlying data is covered in each of the relevant measure analyses) and the impact any inaccuracies in such data may have in the overall index calculation.
- 5.14.3 The definition and procedures for this measure are documented in Section F of Network Rail’s KPI Manual (Issue April 2004). We note that this measure was not audited last year and whilst it was reported as part of overall KPIs in the Business Plan Reconciliation part of the 2003/4 Annual Return we have not audited the ASII reporting process (or value) used at that time against the current calculation method.
- 5.14.4 The audit was based on data supporting calculations and index definitions provided by Network Rail Headquarters (Matthew Clements) and discussions with Tony Smith of Network Rail to clarify calculation methods where required.

Commentary on reported data

- 5.14.5 We note that the regulatory target for this measure is an ASII value of 0.90 for the end of the control period (2008/09). No annual targets have been set. The currently reported value of 0.90 meets the end of period target but we would note the current susceptibility of the reported performance to external factors such as weather.

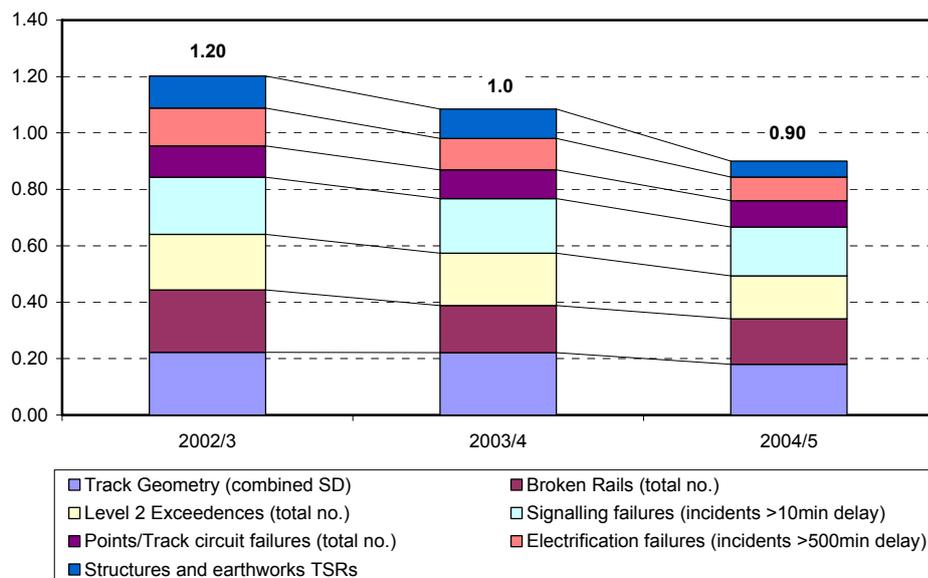


Figure 5.14.1 Asset Stewardship Incentive Index (KPI6)

5.14.6 Network Rail has reported a significant improvement in the ASII reported figure. This reflects an improvement in all of the constituent elements of the index, however the factors dominating this improvement are Structures and Earthworks TSRs and Track Geometry (reflected in both the track geometry and Level 2 parameters). We note that the electrification asset failure metric (for failures generating more than 500 cumulative minutes of delay) also shows a significant improvement, driven largely by improvements in management of severity of failures for DC traction incidents. Figure 5.14.1 shows the comparisons of recorded (normalised) index elements.

5.14.7 For all measures improvement in performance is attributed to improved asset stewardship and the effects of relatively benign weather conditions in 2004/5 (compared to 2003/4). Figure 5.14.2 shows reported ASII results both nationally and by Territory over the past two years with the impacts of adverse winter weather in 2003/4 clearly evident. Continuing improvement since that time supports the impact of weather in determining performance.

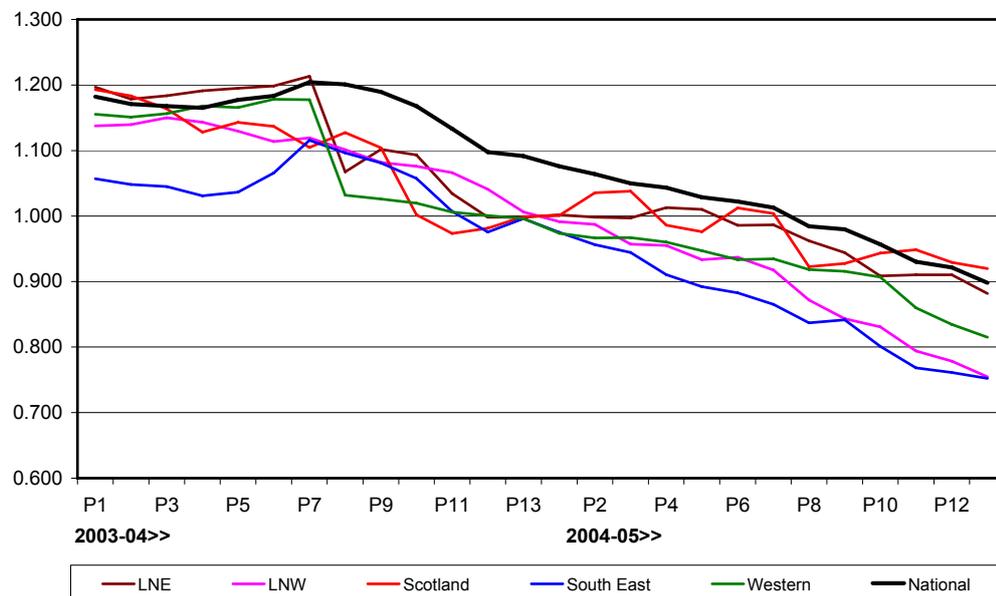


Figure 5.14.2 Asset Stewardship Incentive Index: Territory performance 2003-2005 (KPI6)

Audit findings

Process

5.14.8 Collection and reporting processes for each of the ASII elements are reported against relevant measures (reported by Halcrow unless noted):

- M3 (track geometry - national standard deviation);
- M1 (broken rails);
- M5 (level 2 exceedences);
- Asset Failures (Network Wide Totals) – Mouchel, Reporter B;
- M9 (Signalling failures);
- M11 and M12 (AC and DC power incidents causing train delays respectively);
- M4 (condition of asset temporary speed restrictions).

- 5.14.9 The National Engineering Reporting Manager is responsible for inputting the results for these measures into a spreadsheet which contains an algorithm for calculating and reporting the results.

Accuracy of reported data

- 5.14.10 Our review of reported data was focussed on verification of consistency of reported data for each of the measures above, against values used in the index calculation. We have verified the values and calculation of the ASII against the baselines established in 2002/03.
- 5.14.11 We noted some minor discrepancy in reported data for signalling failures (M9) and the signalling failure figures used in the ASII calculation (see Figure 5.14.3).

Values for signalling failures	2002/03	2003/04	2004/05
Value used in ASII for 'signal failures'	29,077	27,833	24,855
Signal failure measure M9 as reported in Annual Return	29,013	28,098	24,850

Figure 5.14.3 Comparison of data used in the ASII and reported in the Annual Return (KPI6)

- 5.14.12 These differences are not material to the calculation of the overall ASII value.

Assessment of confidence grade

- 5.14.13 The confidence grade for the ASII is determined from those of its constituent parts. We have thus assigned a confidence grade of B3, based on the value of the signalling failures reported measure which has the lowest overall grade.

Audit Statement

- 5.14.14 We have audited the data presented in the Annual Return for the Asset Stewardship Incentive Index (KPI 6). We can confirm the data has been collected in accordance with the relevant procedure, except where our audit report has identified minor shortcomings or variances; we believe these have not materially impacted the reliability and accuracy of the data reported. The data has been assessed as having a confidence grade of B3.

Recommendations arising

- 5.14.15 We have no significant recommendations for improved reporting of the ASII measure.
- 5.14.16 We suggest that reporting may be improved in presentation clarity by inclusion of explicit reference to the dependant measures that are reported elsewhere in the Annual Return.

5.15 Annual Return Section 6 – Finance and Efficiency

Audit scope

- 5.15.1 The scope of this audit was to verify the reliability and accuracy of data reported in Network Rail's Annual Return 2004/05, Section 6, Finance and Efficiency.
- 5.15.2 This Section of the Annual Return was previously reported by Network Rail as "Reconciliation to the Business Plan". The presentation of data differs from previous years in that renewals data is no longer reported by Region (or Territory) but only at route level. The audit base is Section 3 (Network Stewardship Strategy) of Network Rail's Technical Plan, which forms part of Network Rail's 2004 Business Plan.
- 5.15.3 The Reporting for this Section of the Annual Return has been split between Reporter A and Reporter B, reflecting the distribution of our activities elsewhere. In this report, Reporter A is responsible for reporting on:
- (a) Track;
 - (b) Signalling;
 - (c) Electrification;
 - (d) Telecoms.
- 5.15.4 We have also provided commentary on maintenance expenditure reporting.
- 5.15.5 This audit of renewals spend has been restricted to a reconciliation of figures with those presented in the Annual Return with the 2004 Business Plan and an overview of the processes used to collect and present data. A separate exercise is to be completed by the Reporters to review in detail the reporting of variance between planned and actual renewals expenditures. This will be the subject of a separate report.
- 5.15.6 The audit was based on a review of published data and interviews with Jon Cunningham and David Cooke of Network Rail HQ financial reporting team.

Commentary on reported data

Renewals Variance (non WRCM)

- 5.15.7 Network Rail has reported significant underspend (c.20%) against the non-WRCM renewals business plan spend intended for 2004. The largest elements of underspend relate to signalling and plant and machinery renewals – accounting for 57% of the total renewals underspend. We note that electrification and information technology also report significant percentage underspend (47% and 33% respectively) against their discipline budgets (see Figure 5.15.1 overleaf).
- 5.15.8 For the two significant variant elements covered by Reporter A – signalling and electrification – we note that renewals expenditure underspend is largely attributed to deferrals due to delays in scheme design and development. This is supported at route level analysis with numerous schemes delayed pending reassessment and negotiation of contract scopes.
- 5.15.9 Track renewals expenditure is reported as approximately £19m underspent, however at route level, variances in aggregate indicate an underspend total of £98m, offset by overspends of £30m. Centrally held budgets for expected efficiency and central overheads were significantly overspent – reporting a £47m overspend.
- 5.15.10 Similarly, telecoms expenditure is reported as some £30m below budget in total, however budget variance is principally related to centrally controlled schemes with over budget expenditure of some £17m offset by under expenditure of £46m, largely due to lags in project implementation.

Category	Actual Spend	Underspend (£m)	Underspend (%)
Track renewals	609	19	3%
Signalling renewals	183	126	41%
Structures renewals	263	47	15%
Electrification renewals	26	23	47%
Plant & machinery renewals	77	107	58%
IT renewals	86	42	33%
Telecoms renewals	201	30	13%
Stations renewals	124	11	8%
Depots renewals	29	0	0%
Lineside buildings renewals	19	-2	-12%
Other renewals	0	5	100%
Total Renewals	1617	408	20%

Figure 5.15.1 Non WCRM renewals underspend

Maintenance Variance

- 5.15.11 This year saw the completion of taking maintenance in house by Network Rail. Network Rail has reported total expenditure of £1,271m, consistent with 2003/04 expenditure levels. Variance against budget is reported as minimal in total and at Territory level. As with renewals expenditure this masks significant underlying variances.
- 5.15.12 We have sampled underlying data for LNE indicating total positive and negative variances of some £25.5m.

Expenditure Trends

- 5.15.13 Figure 5.15.2 and 5.15.3 shows total renewals expenditure (excluding WCRM) is lower than 2003/04 although broadly consistent with previous years although track renewals remain significantly higher than pr-Hatfield levels. Maintenance expenditure remains consistent with 2003/04 levels.

Category	2000/01	2001/02	2002/03	2003/04	2004/05
Maintenance	698	950	1184	1245	1271
Track renewals	374	540	613	677	609
Signalling renewals	135	189	285	204	183
Telecoms renewals	23	40	75	233	201
Electrification renewals	22	35	25	28	26
Structures renewals	149	232	320	338	263
Stations renewals	163	102	112	86	124
Plant & machinery renewals	162	87	39	154	77
IT renewals	0	30	142	92	86
Depots renewals	12	18	30	34	29
Lineside buildings renewals	0	4	12	20	19
Other renewals	5	25	0	0	0
Total Renewals	1043	1302	1653	1866	1617
WCRM	708	639	766	1339	1048
Total Maintenance and Renewals and WCRM	2449	2891	3603	4449	3936

Figure 5.15.2 Network Spend (Maintenance and Renewals) 2000 - 2005

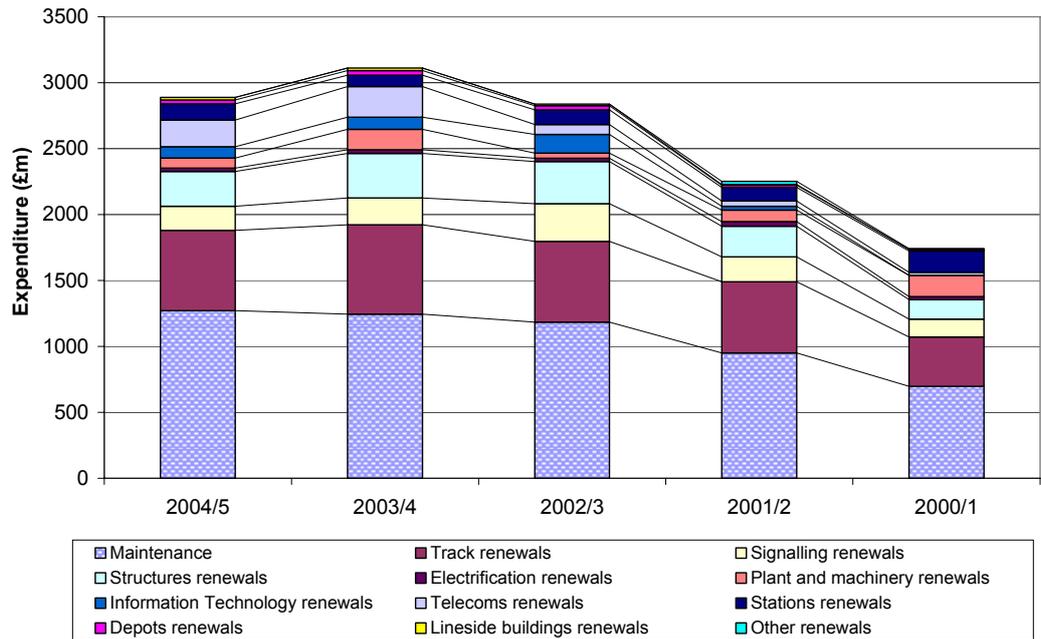


Figure 5.15.3 Network Spend (Maintenance and Renewals) 2000 - 2005

5.15.14 For the disciplines covered by Reporter A, we have reviewed the reported activity volumes for track and signalling and corresponding renewals spend (excluding WCRM). Figures 5.15.4 and 5.15.5 show a poor correlation between overall costs and volumes – implying significant variations in unit costs between years.

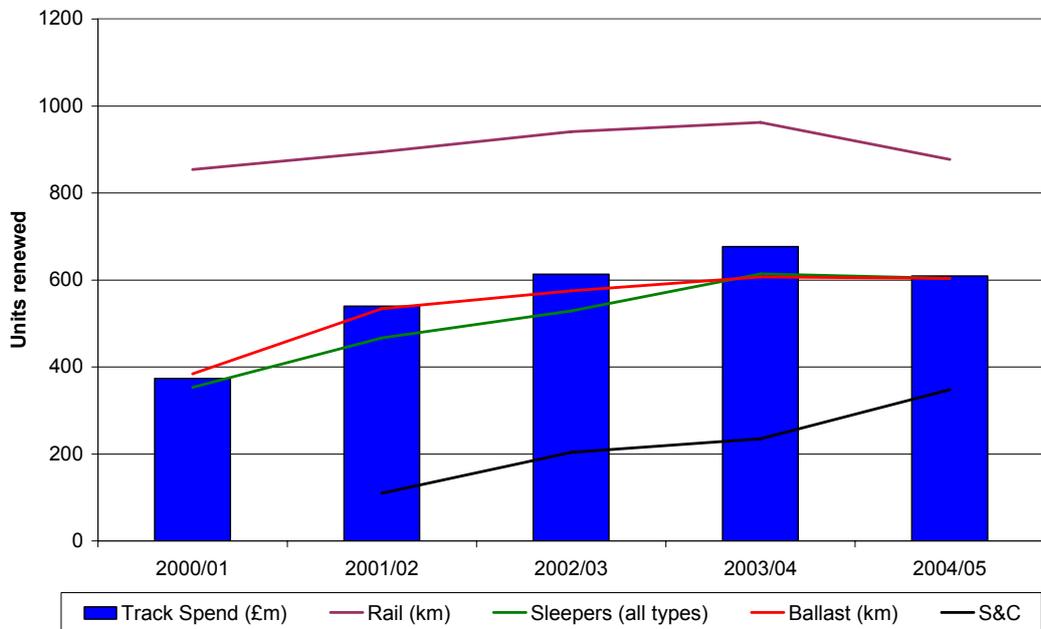


Figure 5.15.4 Track renewals spends and volumes

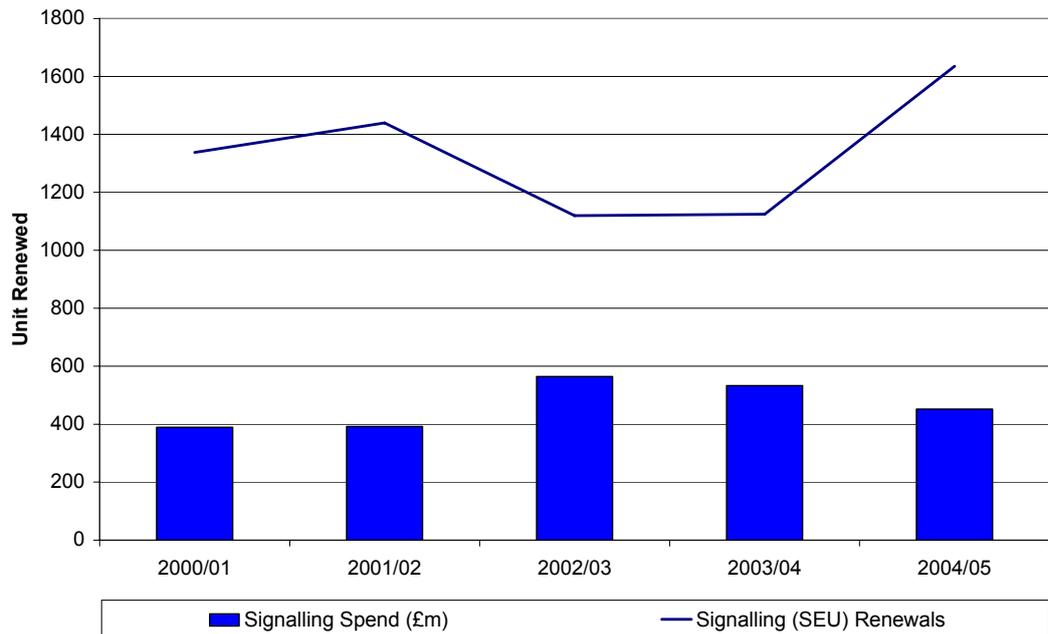


Figure 5.15.5 Signalling renewals (SEU) and renewals expenditure (note: this graph includes WCRM renewals volumes as non-WCRM SEU totals are not separately reported)

- 5.15.15 We have not been able to fully establish the linkages between spend and activity nor the opportunity to identify efficiency.

Audit of collection and reporting processes

- 5.15.16 Data for the reporting of business plan reconciliation has been prepared centrally and has not fundamentally changed from that reported in previous years. This year, however, we note that forecast data corresponds directly with Business Plan budgets published in the 2004 plan. This is partly achieved by reporting achievements against central overlays separately. The robustness of this (in relation to potential “double counting” or mis-reporting of efficiency and unit costs) will be further explored as part of the separate renewals expenditure variance analysis.
- 5.15.17 Despite renewals data now only being reported by route (rather than regionally or by Territory), Network Rail’s project control and business planning systems do not provide the functionality required to directly report expenditure by route. Reporting of data at route level is completed by means of a manual allocation process, relying on regionally reported data. This has been further complicated by the change of structure from Regions to Territories requiring significant manual scrutiny and adjustment to cost allocations. Data files were not available in a format for auditing which could demonstrate a reliable audit trail. Further review of reporting processes will be completed during the renewals variance analysis.

Audit of reported data

- 5.15.18 Our review of reported data was focussed on verification of consistency of published data with the information presented in the 2004 Business Plan and for internal consistency of cost reporting. We have verified the values presented for Business Plan forecasts and internal consistency of total and route based expenditure data.

Assessment of confidence grade

- 5.15.19 We have assigned a confidence grade to the data reported for maintenance, track, signalling, telecoms and electrification renewals of B2 for total expenditure; and a confidence grade of B3 to disaggregated route expenditure reporting. We are undertaking a separate study of Network Rail's renewals expenditure variance reporting which will further inform this initial assessment.

Assessment against regulatory target

- 5.15.20 We note that renewals expenditure is significantly below expected levels set out in the ACR 2003 conclusions. We have not assessed achievement of unit cost, maintenance and operating cost efficiency (the latter two are included in Reporter B scope).

Audit Statement

- 5.15.21 We have audited the data presented in the Annual Return for the Finance and Efficiency Section, specifically renewals for track, signalling, telecoms and electrification assets, with further comment on maintenance expenditure reporting. We can confirm the data has been reported in accordance with the relevant procedures. The data has been assessed as having a confidence grade of B2 for discipline and aggregate reporting and confidence grade B3 for route-based expenditure reporting.

Recommendations arising

- 5.15.22 We note that renewals expenditure variance reporting is to be extended to further sub categorisation. This will be commented on as part of the separate renewals variance analysis.
- 5.15.23 **Finance & Efficiency recommendation 1.** We recommend improvements in the transparency and support systems to allow route based reporting of expenditure
- 5.15.24 **Finance & Efficiency recommendation 2.** We recommend variance analysis be expanded to include details of positive and negative variances for maintenance expenditure.

6 Conclusion

- 6.1.1 Network Rail is responsible for preparing the 2005 Annual Return in accordance with its regulatory and statutory obligations using procedures prepared by Network Rail and agreed with Office of Rail Regulation. Our responsibility is to audit the reported data for certain measures in the 2005 Annual Return as agreed with Office of Rail Regulation and Network Rail.
- 6.1.2 We have audited data in the 2005 Annual Return relating to these measures and other disclosures as appropriate.
- 6.1.3 This report, including opinions, has been prepared for use of Office of Rail Regulation and for no other purpose. We do not, in reporting, accept responsibility for any other purpose or to any other person to whom this report is shown. We report our opinion as to whether the 2005 Annual Return gives a representative view and whether the data reported by Network Rail is consistent with evidence provided to us at audit.
- 6.1.4 We conducted our audit in accordance with an audit plan. Our audit included examination, on a sample basis, of evidence relevant to the data and disclosures in the 2005 Annual Return. We planned and performed our audit so as to obtain information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance on the validity of data in the 2005 Annual Return regarding the measures for which we are responsible.
- 6.1.5 In our opinion, the reported information is a reasonable representation of performance except as noted in our commentaries. Generally, except as noted in our Report, data has been properly prepared in accordance with agreed procedures and incorporated into the network totals.
- 6.1.6 Certain data in the 2005 Annual Return is of poor quality and we have noted some systemic shortcomings in the areas of consistency of application of procedures and quality control. We have recommended that the definitions or procedures of certain measures be reviewed and identified the need to improve certain other data collection and control processes.

Commentary

- 6.1.7 We note that Network Rail's reported level of stewardship performance, reflected in the condition and serviceability measures, has generally shown an improvement against that reported in 2003/04 whilst core network renewals expenditure has significantly decreased. However, renewals expenditure over the past five years peaked in 2003/04 and for a number of assets serviceability measures, progress against previous targets set for the period 2000/01-2003/04 had not been achieved. A number of regulatory target baselines for Control Period 3 have been re-set following the Access Charges Review 2003 on the basis of improvement against the reported performance of 2003/04 or earlier. Notably, for signalling and electrification this has led to an easing of performance targets for Control Period 3, whilst for track this has led to setting of more stringent targets.

7 Appendix A: Audit meeting schedule

Date	Venue	Audit	For Network Rail	For Reporter A
13/06/05	Network Rail HQ, Melton St, London	M1 M2	<ul style="list-style-type: none"> Matthew Clements, National Engineering Reporting Manager 	<ul style="list-style-type: none"> Megan Gittins Bob Collinson
14/06/05	Network Rail HQ, Melton St, London	M3 M5	<ul style="list-style-type: none"> John Turner, National Track Geometry Analyst 	<ul style="list-style-type: none"> Megan Gittins Bob Collinson
14/06/05	Network Rail HQ, Eastern House, London	M1 M2 M3 M5	<ul style="list-style-type: none"> Brian Witney, National Rail Management Engineer 	<ul style="list-style-type: none"> Megan Gittins Bob Collinson
15/06/05	West Coast Route Modernisation, 1 Eversholt St, London	M20 M21 M22 M24 M25	<ul style="list-style-type: none"> Alan Robinson, WCRM Performance Measurement Manager 	<ul style="list-style-type: none"> Duncan Mills
16/06/05	Network Rail HQ, Melton St, London	M15 M16	<ul style="list-style-type: none"> Glenn Wiles, Principal Engineer (Contact Systems) 	<ul style="list-style-type: none"> Duncan Mills Ken Foster Bob Care
16/06/05	Network Rail HQ, Melton St, London	M13 M14	<ul style="list-style-type: none"> Dave McQuillan, HQ Distribution Engineer 	<ul style="list-style-type: none"> Duncan Mills Ken Foster Bob Care
16/06/05	Network Rail HQ, Melton St, London	M11 M12	<ul style="list-style-type: none"> Nick Snell, Strategy Engineer, E&P Matthew Clements, National Engineering Reporting Manager Charles Hervey, Business Planning Manager, E&P 	<ul style="list-style-type: none"> Duncan Mills Ken Foster Bob Care
21/06/05	Scotland Territory, Buchanan House, Glasgow	M11 M13 M15	<ul style="list-style-type: none"> Ron Garrett, Territory E&P Engineer Andrew Banks, Territory E&P Engineer (Distribution) Bob MacDonald, Territory E&P Engineer (Contact Systems) Adrian Murray, Territory Renewals Engineer (E&P) 	<ul style="list-style-type: none"> Duncan Mills Ken Foster
23/06/05	Network Rail HQ, Melton St, London	M4	<ul style="list-style-type: none"> Richard O'Brien, Head of Operational Planning Chris Myers, TSR Planner 	<ul style="list-style-type: none"> Duncan Mills
23/06/05	LNW Territory, The Mailbox, Birmingham	M10	<ul style="list-style-type: none"> Graham Wire, Territory Renewals Engineer (Signals) Peter Gorry, Signal Renewal Assessment Engineer 	<ul style="list-style-type: none"> Duncan Mills Bob Wyatt Philip Morton
24/06/05	MP&I Track, Melton St London	M20 M21 M22 M25	<ul style="list-style-type: none"> Ian Wright, Senior Contract & Procurement Manager, MP&I Track 	<ul style="list-style-type: none"> Duncan Mills
27/06/05	South East Territory, Waterloo Offices, London	M11 M13 M15	<ul style="list-style-type: none"> Chris Elsey, Territory E&P Engineer Kyle Windsor, Assurance Engineer (Electrical Distribution) Marc Alderman, HV Coordinator 	<ul style="list-style-type: none"> Duncan Mills Ken Foster
28/06/05	West Coast South Area, Melton House, Watford	M1 M2 M3 M5	<ul style="list-style-type: none"> James Dean, West Coast South Area Track Engineer 	<ul style="list-style-type: none"> Megan Gittins Bob Collinson
28/06/05	London North Eastern Territory, Hudson House, York	M11 M12 M13 M14 M15 M16	<ul style="list-style-type: none"> Paul Ramsey, Territory E&P Engineer Rob Wilkins, Assurance Engineer (Contact Systems) 	<ul style="list-style-type: none"> Duncan Mills Ken Foster
28/6/05	40 Melton Street	Business Plan	<ul style="list-style-type: none"> David Cooke John Cunningham 	<ul style="list-style-type: none"> Michael Jamieson
28/6/05	Teleconference	ASII	<ul style="list-style-type: none"> Matthew Clements 	<ul style="list-style-type: none"> Michael Jamieson

Date	Venue	Audit	For Network Rail	For Reporter A
29/06/05	Wessex Area, Woking	M1 M2 M3 M5	<ul style="list-style-type: none"> • Bill Gove, Wessex Area Rail Engineer 	<ul style="list-style-type: none"> • Megan Gittins • Bob Collinson
29/06/05	Network Rail HQ, Anglia House, London	M20 M21 M22 M24 M25	<ul style="list-style-type: none"> • Tom Griffiths Programme Manager (Development) MP&I Enhancements 	<ul style="list-style-type: none"> • Duncan Mills
30/06/05	Western Territory	M10	<ul style="list-style-type: none"> • Matthew Spencer, Territory Renewals Engineer (Signals) • Jill Poynton, Signal Renewal Assessment Engineer 	<ul style="list-style-type: none"> • Duncan Mills • Bob Wyatt • Philip Morton
30/06/05	West Country Area, Bristol & Parkway Depot, Bristol	M1 M2 M3 M5	<ul style="list-style-type: none"> • Sean Watters, West Country Area Track Engineer • Adrian Sharp, West Country Area Track Section Manager Rail • Jim Oliver, West Country Welding Inspector 	<ul style="list-style-type: none"> • Megan Gittins • Bob Collinson
01/07/05	Network Rail HQ, Melton St, London	M9	<ul style="list-style-type: none"> • David Marriot, Senior Signal Maintenance Development Engineer • Ian Griffiths, Senior Performance Engineer 	<ul style="list-style-type: none"> • Duncan Mills • Bob Wyatt • Philip Morton
01/07/05	Scotland West Area, Rutherglen Depot, Glasgow	M1 M2 M3 M5	<ul style="list-style-type: none"> • Phil Quin, Scotland West Area Rail Management Engineer • Eric Ryder, Scotland West Area Track Engineer 	<ul style="list-style-type: none"> • Megan Gittins • Bob Collinson
04/07/05	South East Territory	M10	<ul style="list-style-type: none"> • Mike Laybourne, Signal Renewal Assessment Engineer • Kevin Leech, Signal Renewal Requirement Engineer • Ken Gray, Territory Renewals Engineer (Signals) 	<ul style="list-style-type: none"> • Duncan Mills • Bob Wyatt • Philip Morton
05/07/05	South East Territory, Waterloo Offices, London	M12 M14 M16	<ul style="list-style-type: none"> • Chris Elsey, Territory E&P Engineer • Kyle Windsor, Assurance Engineer (Distribution) • Marc Alderman, HV Coordinator 	<ul style="list-style-type: none"> • Duncan Mills • Bob Care
08/07/05	LNE Territory	M10	<ul style="list-style-type: none"> • Steve Gall, Territory Renewals Engineer (Signals) 	<ul style="list-style-type: none"> • Philip Morton
12/7/05	Teleconference	Business Plan	<ul style="list-style-type: none"> • John Cunningham 	<ul style="list-style-type: none"> • Michael Jamieson
13/07/05	London North Western & Western Territories, The Mailbox, Birmingham	M11 M12 M13 M14 M15 M16	<ul style="list-style-type: none"> • Graeme Beale, Territory E&P Engineer • Brian Waldren, Territory E&P Engineer (Distribution) 	<ul style="list-style-type: none"> • Duncan Mills • Ken Foster
14/07/05	Engineering Support Centre, Derby	M3 M5	<ul style="list-style-type: none"> • Simon Broomhead, Engineering Support Group Manager • Ian Groot, Integrated Examination Train Manager 	<ul style="list-style-type: none"> • Megan Gittins • Bob Collinson
15/07/05	North East Area, Hudson House, York	M1 M2 M3 M5	<ul style="list-style-type: none"> • Ian Kitching, North East Area Track Engineer • Andrew Beeson, Territory Rail Management Engineer 	<ul style="list-style-type: none"> • Megan Gittins • Bob Collinson
18/7/05	Teleconference	ASII	<ul style="list-style-type: none"> • Tony Smith 	<ul style="list-style-type: none"> • Michael Jamieson
19/07/05	Abergavenny (incl. line to Pontrilas and Tram Inn)	M10	<ul style="list-style-type: none"> • Peter Day and David Rodd, AMEY for Network Rail Western Territory 	<ul style="list-style-type: none"> • Philip Morton

8 Appendix B: OFWAT confidence grading system

8.1.1 This Appendix presents the criteria used for assigning confidence grades which is used in Reporting to OFWAT:

8.1.2 “The [OFWAT] confidence grading system has been established to provide a reasoned basis for undertakers to qualify information in respect to reliability and accuracy. It is essential that proper care and a high level of application is given by the [Water] Company and its Reporter to the assignment of confidence grades to data requiring such annexation. A quality-assured approach should be employed in the methodology used to assign confidence grades, particularly if sampling techniques are in place.

8.1.3 The confidence grade combines elements of reliability and accuracy, for example:

- (a) A2: Data based on sound records etc. (A, highly reliable) and estimated to be within +/- 5% (accuracy band 2);
- (b) C4: Data based on extrapolation from a limited sample (C, unreliable) and estimated to be within +/- 25% (accuracy band 4);
- (c) AX: Data based on sound records etc. (A, highly reliable) but value too small to calculate meaningful accuracy percentage.

8.1.4 Reliability and accuracy bands are shown in the tables below.

Reliability Band	Description
A	Sound textual records, procedures, investigations or analysis properly documented and recognised as the best method of assessment.
B	As A but with minor shortcomings. Examples include old assessment, some missing documentation, some reliance on unconfirmed reports, some use of extrapolation.
C	Extrapolation from limited sample for which Grade A or B data is available.
D	Unconfirmed verbal reports, cursory inspections or analysis.

Accuracy Band	Accuracy to or within +/-	but outside +/-
1	1%	-
2	5%	1%
3	10%	5%
4	25%	10%
5	50%	25%
6	100%	50%
X	accuracy outside +/- 100 %, small numbers or otherwise incompatible (see table below)	

8.1.5 Certain reliability and accuracy band combinations are considered to be incompatible and these are blocked out in the table below.

Compatible Confidence Grades				
Accuracy Band	Reliability Band			
	A	B	C	D
1	A1			
2	A2	B2	C2	
3	A3	B3	C3	D3
4	A4	B4	C4	D4
5			C5	D5
6				D6
X	AX	BX	CX	DX

- 8.1.6 Systems for the acquisition, collation and presentation of regulatory data are expected to have reached an advanced level of development. In most cases, a confidence grade of A2, A3, B2 or better is expected. Where confidence grades are below these levels, companies should report on their action plans for improvement in the commentary for the table concerned. They should justify in their reports where action plans are limited to the achievement of A4, B3, B4 or C2 levels.
- 8.1.7 Any deterioration in confidence grades from those reported in the previous Annual Return should be explained together with the action plan for improvement as appropriate.
- 8.1.8 Reports on action plans should include the projected confidence grades, but confidence grades entered in the tables should reflect the current status of the data and not the future status it is intended to achieve.
- 8.1.9 All confidence grades reported should be commented on by the Reporter (or, as appropriate, the Auditor). In each case, they are required to state whether they agree with the confidence grading and if not, provide their opinion. Reporters should also comment on any deterioration, the reason provided by the company, and either the action plan for improvement or justification for limited achievement as noted above. Where there is disagreement between the parties, the Director will normally use the Reporter's assessment of the confidence grade."

9 Appendix C: Checks performed on M4 data

- 9.1.1 The following checks are undertaken on M4 data; these checks are not explicitly documented in the procedure RT/ARM/M4DF (issue 6).
- 9.1.2 PPS performs the following validation of data:
- (a) Checks the TSR start time/date is before the end time/date and that both fields are populated;
 - (b) Checks that the locations used are on the Route selected and that locations and line data is entered;
 - (c) Furthermore, the TSR data is repeatedly manually checked and error corrected throughout the Draft WON and WON process.
- 9.1.3 The spreadsheet performs the following validation of data:
- (a) Checks the date imposed is a valid format, and not blank;
 - (b) Checks the date ended is a valid format and is greater than the date imposed;
 - (c) Checks the date imposed is less than the period end date (i.e. the end of the year);
 - (d) Checks the start miles and start sub unit (chains or yards) are numbers and not blank;
 - (e) Checks the end miles and end sub unit (chains or yards) are numbers and not blank;
 - (f) Checks the start and end sub units are less than 80 (or 1760 where yards are used);
 - (g) Checks that the passenger and freight speeds imposed are not blank or negative;
 - (h) Checks that the passenger and line speeds are not blank or negative;
 - (i) Checks that the passenger speed imposed is less than or equal to the passenger linespeed;
 - (j) Checks that the freight speed imposed is less than or equal to the freight linespeed.
- 9.1.4 The following manual checks are performed:
- (a) Check that only TSR sites with a duration of 4 weeks or more are included;
 - (b) Check that the total of the scores obtained for the Routes is the same as the total score obtained separately;
 - (c) Check that there are no mileage changes to skew the "length" calculation.

10 Appendix D: Recommendations

Recommendation
Process Recommendation 1. We recommend that, early in each calendar year, the HQ Champions and Reporter should formally agree a deadline by which time the Annual Return data should be expected by all parties to be finalised and available for audit.
Process Recommendation 2. The quality of data collection and the length of the dataset have increased since the ORR Access Charges Review 2000. We would generally expect this to have led to a reduction in the size of the tolerances required. We recommend that the tolerances are recalculated for the next Annual Return.
Process recommendation 3. We would expect the mission critical measures to have higher levels of confidence. We recommend that ORR and Network Rail should agree target confidence grades for each measure for future Annual Returns and that Network Rail should develop Action Plans for achieving these levels of data reliability and accuracy for each measure.
M1 Recommendation 1. We recommend that the use of two parallel systems (Control Logs/ Broken Rail Information Sheet and Area Defect Databases/ Raildata) for reporting the number of broken rails is reviewed.
M2 recommendation 1. We remain concerned as to the accuracy of data reported and the extent of 'data refreshes' at the start of each year for the M2 measure which has directly led to the confidence grade of B4. We recommend that Network Rail review the process of collecting and reporting the M2 measure to identify the need for data refreshes and take steps to eliminate these causes where practicable. An action plan to improve the confidence grade should be produced and agreed with ORR and the Reporter.
M2 recommendation 2. We recommend that the script for uploading and validating data from the Area Defect Databases to Raildata is altered to enforce the mandatory fields specified in Network Rail's Rail Failure Handbook (RT/CE/S/057).
M4 recommendation 1. The procedure RT/ARM/M4PR (issue 6) should be up-dated to reflect the change of organisation.
M4 recommendation 2. The procedure RT/ARM/M4PR (issue 6) and instructions to Area delivery planning teams should be up-dated to use PPS for recording ESRs on all routes, similar to current practice for planned TSRs.
M9 recommendation 1. The procedure RT/ARM/M9PR (issue 3) should be up-dated to reflect the change of organisation.
M9 recommendation 2. The accuracy of data reported under this measure should be improved by reviewing the DAG in order to improve the attribution of delay; this review should seek to ensure that – as a matter of principle – attribution to delay categories is based on likely root-cause rather than on the first reported symptoms. This has been a recommendation in previous years.
M9 recommendation 3. The accuracy of data reported under this measure should be improved by organising the Area maintenance team or other appropriate person to check the attribution of delays for this measure; this check should confirm that delays attributed to signalling delay categories for this measure were indeed caused by failure of the signalling system, using Network Rail's fault management system (FMS) or other analysis of root-cause. This has been a recommendation in previous years.
M10 recommendation 1. The procedure RT/ARM/M10PR (issue 3) should be up-dated to reflect the change of organisation.
M10 recommendation 2. The procedure and definition should be amended to document the current practice of applying adjustment factors to SICA2B, pSICA and pSICA3 scores. The documentation for M10 is deficient until this recommendation is completed.
M10 recommendation 3. The adjustment factor applied by HQ to residual lives identified by SICA2B, pSICA and pSICA3 should be further researched and documented to provide evidence for the level of the adjustment factor. This will improve accuracy for measure M10.
M10 recommendation 4. The historic data for this measure should be restated, reporting Great Western's SICA 2B assessments for the year in which they were undertaken. The reported data for M10 currently overstates the number of assessments undertaken in 2003/04.
M10 recommendation 5. We recommend that Network Rail should develop and roll-out a training course and associated competence management system for the SICA3 process. This should include a process for mentoring and checking SICA3 assessments.
M10 recommendation 6. We recommend that additional resources should be identified to complete the 178 remaining SICA assessments in LNE Territory.
M10 recommendation 7. We recommend that Western Territory (a) undertake separate assessments for each interlocking and (b) review the impact of undertaking single assessments for signalling control centres on its condition grades.
M11 recommendation 1. We recommend that this measure is expanded to cover DC overhead line incidents.

Recommendation
M13 recommendation 1. We recommend that the M13-ECAP questionnaire should be reviewed in 2005/06; this would enable a new questionnaire to be used in 2006/07 once the population has been assessed using the current questionnaire. This review should incorporate appropriate Territory and Area personnel and the specific recommendations made by Reporter A in previous years.
M13 recommendation 2. We recommend the condition assessments for this measure are undertaken at the four-yearly inspection not at specific five-yearly site visits.
M13 recommendation 3. Similar to previous years, we recommend that one or more measures for reporting on the condition of plant are developed by Network Rail and incorporated in the Annual Return.
M13 recommendation 4. We recommend that Network Rail should develop and roll-out a training course and associated competence management system for the M13-ECAP process. This should include a process for mentoring and checking assessments.
M15 recommendation 1. We recommend that the change process for allocating maintenance resources to undertaken the M15 inspection process is completed as a matter of urgency.
M15 recommendation 2. We recommend that the spreadsheet used to calculate this measure is (a) formatted in line with standard practice to improve clarity, (b) tidied so that regulatory calculations are in a logical order and (c) other unrelated calculations are deleted or moved to another spreadsheet.
M16 recommendation 1. We recommend that the spreadsheets used to calculate this measure are (a) consistently formatted in line with standard practice to improve clarity and (b) tidied so that regulatory calculations are in a logical order.
M25 recommendation 1. The WCRM PCS definitions for "Renew" and "Heavy Maintenance" should be aligned with the regulatory definitions for full S&C renewal and partial S&C renewal if possible.
Finance & Efficiency recommendation 1. We recommend improvements in the transparency and support systems to allow route based reporting of expenditure
Finance & Efficiency recommendation 2. We recommend variance analysis be expanded to include details of positive and negative variances for maintenance expenditure.